



## USER MANUAL

# PCN-1001 (DynaPCN 10-01-00)

RS485 Passenger & People Counter

Rev 6.0 – 27 October 2015 – PCN-1001-DYPCN-10-01-00\_UserMan\_En\_6.0

## Trademarks

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## Revision history

| REVISION | DESCRIPTION   | DATE             |
|----------|---|------------------|
| 2.0      | <ul style="list-style-type: none"><li>Joined together the programming and the Installation manuals into "PCN-1001_Manual_2.0"</li></ul>   | September 2007   |
| 2.1      | <ul style="list-style-type: none"><li>Corrected M1 &amp; M2 pinouts</li></ul>   | November 2007    |
| 2.2      | <ul style="list-style-type: none"><li>Minor changes</li></ul>   | November 2007    |
| 2.3      | <ul style="list-style-type: none"><li>Added "The maximum suggested number of Counters to connect together is 5" on note on page 19</li><li>Added cable kit note on pages 20 and 21</li></ul>  | February 2008    |
| 2.4      | <ul style="list-style-type: none"><li>Added Notes on page 49</li><li>Removed "testin0/1" command from "The RS485 protocol" table on pag76</li></ul>   | April 2008       |
| 2.5      | <ul style="list-style-type: none"><li>Relevant changes applied to pages: 15, 36, 40, 46 to 48, 53 to 55</li></ul>   | August 2008      |
| 2.6      | <ul style="list-style-type: none"><li>Manual layout update</li><li>"Installing/Updating the software" paragraph updated</li><li>WinClient screenshots updated to rev 2.3.3</li></ul>  | May 2009         |
| 2.7      | <ul style="list-style-type: none"><li>Updated CRC16 Algorithm on page 80</li><li>Updated RS485 information on page 67 and 68</li></ul>  | February 2010    |
| 2.8      | <ul style="list-style-type: none"><li>Small corrections on pages 11 and 68</li></ul>  | March 2010       |
| 2.9      | <ul style="list-style-type: none"><li>Updated WinClient features to reflect version 2.3.5</li></ul>   | May 2010         |
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| 3.1      | <ul style="list-style-type: none"><li>Added paragraph <i>Cleaning</i> on page 7</li><li>Updated paragraph <i>The "Wide-Gate" tab</i> on page 63</li><li>Updated paragraph <i>Notes about the Digital I/O interface</i> on page 61</li></ul> | September 2010   |
| 3.2      | <ul style="list-style-type: none"><li>Minor changes</li></ul>   | April 2011       |
| 4.0      | <ul style="list-style-type: none"><li>General contents review</li></ul>   | 23 December 2011 |
| 5.0      | <ul style="list-style-type: none"><li>General contents review</li></ul>   | 4 July 2014      |
| 6.0      | <ul style="list-style-type: none"><li>Updated features and MTBF value</li><li>Updated temperature and power supply information</li><li>Added EN 45545 compliance</li><li>Updated Digital Input features</li></ul>                           | 27 October 2015  |

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## Important user information

**Please carefully read and understand the instructions in this manual before using the device.**

Whenever you have any doubts regarding the operation of this device, first consult this manual, and then if you are still unable to resolve your issue, contact the Eurotech Technical Support Team for assistance.

**To lower the risk of personal injury, electric shock, fire or damage to equipment, you must observe the following precautions, as well as using good technical judgment, whenever installing or using this device.**

### Alerts that can be found throughout this manual

| Symbol  | Meaning   |
|---|---|
|    | <p><b>DANGER!</b><br/>Information highlighting potential electrical shock hazards:</p> <ul style="list-style-type: none"><li>• Personal injury or death could occur.</li><li>• Damage to the system, connected peripheral devices, or software could occur.</li></ul> <p>Appropriate safety precautions should always be used; these should meet the requirements set out for the environment that the equipment will be deployed in.</p> |
|  | <p><b>WARNING!</b><br/>Information highlighting potential hazards:</p> <ul style="list-style-type: none"><li>• Personal injury or death could occur.</li><li>• Damage to the system, connected peripheral devices, or software could occur.</li></ul> <p>Appropriate safety precautions should always be used; these should meet the requirements set out for the environment that the equipment will be deployed in.</p>                 |
|  | <p><b>NOTE</b><br/>These will highlight important features or instructions.</p>   |

## Safety notices and warnings

Users must observe the following safety precautions during all phases of operation, service, and repair of the device. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the device.

Eurotech assumes no liability for the customer's failure to comply with these requirements.

The safety precautions listed below represent warnings of certain dangers of which Eurotech is aware. You, as the user of the device, should follow these warnings and all other safety precautions necessary for the safe operation of the device in your operating environment.

### *Do not operate in an explosive atmosphere*



**WARNING!**

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

### *Antistatic precautions*



**WARNING!**

To avoid ESD (Electro Static Discharge) damage, always use appropriate antistatic precautions when handling any electronic equipment.

### *Connection to power supply or other devices*



**DANGER!**

Before applying power to the system, thoroughly review all installation, operation, and safety instructions.

Failure to install the system power supply correctly or to follow all operating instructions correctly may create an electrical shock hazard, which can result in personal injury or loss of life, and/or damage to equipment or other property

To avoid injuries, always disconnect power and discharge circuits before touching them.

Only start the device with a power supply that meets the requirements stated on the voltage label. In case of uncertainties about the required power supply, please contact the Eurotech Technical Support Team or the electricity authority

Before connecting other equipment carefully read any supplied instructions

Always disconnect the power before connecting or disconnecting cables

Do not perform connections with wet hands

Check any power cords for damage before use

Use certified power cables. The power cable must meet the requirements (voltage and current) of the device.

Position cables with care. Avoid positioning cables in places where they may be trampled on or compressed by objects placed on them. Take particular care of the plug, power-point and outlet of power cable

Avoid overcharging any power outlets

Only apply power to the device or connected equipment after checking that all the above conditions have been met



## Installation

**WARNING!**

Verify that the mounting location can withstand the added loads caused by the addition of the device, it should be firmly secured so that it will not cause any potentially hazardous situations (e.g. falling down due to vibration or shock)  
Do not operate the device near heat sources or flames.

**NOTE:**

If the device must be moved from one place to another with different ambient temperatures, ensure sufficient time for the temperature of the device to stabilize before repowering.

## Ventilation

**WARNING!**

Ensure adequate ventilation to avoid overheating, Eurotech suggests the following steps:  
When installing the device within a cabinet, rack or other enclosed space, be sure to leave sufficient space to allow adequate air circulation  
Do not block any ventilation openings

## Maintenance

**DANGER!**

Never open, dismantle or repair the device!  
For your maintenance or repair requirement please contact a qualified Eurotech engineer.  
If the device does not function correctly and you are unable to find a solution, feel free to contact the Eurotech Technical Support Team.

If the equipment does not work properly, especially if smells unusual, unplug it immediately and contact Technical Support Eurotech (see fourth cover of this manual for details).

## Cleaning

**WARNING!**

When cleaning the device, remember to:  
Ensure sufficient ESD protection during the cleaning process  
Remove any power from the device  
Use a dry cloth to remove dust and fingerprints from the external casing  
Do not use detergents, aerosol sprays, solvents or abrasive sponges

To clean the lenses:

Use a blower to remove any dust  
Use water-based, non-flammable, glass/plastic cleaner products to remove all types of dirt; grease, oil, nicotine etc. from the lenses  
Gently wipe the lenses with a lint-free cloth.

**WARNING!**

The PCN-1001 should not be used for extended periods of time with the service plate removed. Doing so can cause dust and other particulates to enter the system thus causing degradation to the optics.  
If it is necessary to have extended access to the Mini-USB connector, take appropriate precautions to stop any particulates from entering.

## Life support policy

**WARNING!**

Users must not use Eurotech products as critical components of life support devices or systems without the express written approval of Eurotech.

## Warranty

Please contact your local Eurotech Sales Office for detailed warranty terms and conditions. Refer to the back covers of this manual for full contact details.

## CE Notice

This product is marked CE.

The CE Mark on the product indicates that the system has been tested and conforms to the provisions of the 2004/108/EC Electromagnetic Compatibility (EMC) Directive and the 2006/95/EC Low Voltage Directive (LVD).

Eurotech shall not be liable for use of our products with equipment (i.e., power supplies, personal computers, etc.) that are not CE marked and that do not meet the PCN-1001 technical requirements indicated in this manual.



## WEEE

The information below complies with the regulations set out in the 2002/96/EC directive, subsequently superseded by 2003/108/EC. It refers electrical and electronic equipment and the waste management of such products.

When disposing of a device, including all of its components, subassemblies and materials that are an integral part of the product, you should consider the WEEE directive.

The use of the following symbol, attached to the equipment, packaging, instruction literature, or the guarantee sheet, states that the device has been marketed after August 13th 2005, and implies that you must separate all of its components when possible, and dispose of them in accordance withal waste disposal legislations:



Because of the substances present in the equipment, improper use or disposal of the refuse can cause damage to human health and the environment.

With reference to WEEE, it is compulsory not to dispose of the equipment with normal urban refuse; an arrangement for separate collection and disposal is essential.

To avoid any possible legal implications users should contact the local waste collection body for full recycling information.

## RoHS

This device, including all the components, subassemblies and the consumable materials that are an integral part of the product, have been manufactured in compliance with the European directive 2002/95/EC known as the RoHS directive (Restrictions of the use of certain Hazardous Substances). This directive targets the reduction of certain hazardous substances previously used in electrical and electronic equipment (EEE).

## Technical assistance

For any technical questions, or if you cannot isolate a problem with your device, or for any enquiry about repair and returns policies, feel free to contact your local Eurotech Technical Support Team.

See the back cover for full contact details.

## Transportation

When transporting any module or system, for any reason, it should be packed using anti-static material and placed in a sturdy box with enough packing material to adequately cushion it.



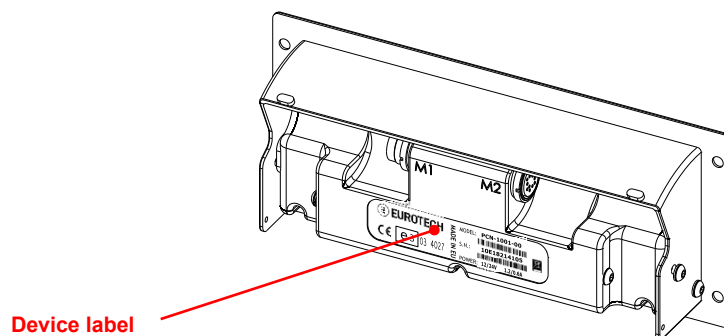
**Warning:**

Any product returned to Eurotech that is damaged due to inappropriate packaging will not be covered by the warranty!

## Device labelling

On the rear side of the device you can find a label displaying the following information:

- Model Number
- Serial Number
- Power Requirements



## Conventions and definitions used within this Manual

The following conventions and definitions are used throughout this manual:

### *The “Mode” of the register:*

| SYMBOL / TEXT | DEFINITION                           |
|---------------|--------------------------------------|
| <b>RW</b>     | Readable and Writable register       |
| <b>RO</b>     | Read only register                   |
| <b>W</b>      | Meaning of the register when written |
| <b>R</b>      | Meaning of the register when read    |

### *Hexadecimal numbering:*

Hexadecimal numbers are indicated like this: 0x01.

### *Control Unit, Host PC*

The terms “Control Unit” and “Host PC” are used to describe a computer connected to the PCN-1001 for maintenance and configuration activities.

### *PCN-1001, Device, Counter, Master, Slave*

In this manual the terms:

- “PCN-1001”
- “Device”
- “System”
- “Counter”
- “Master”
- “Slave”

are used to describe the PCN-1001 people/passenger counter.

## PART 1 – INTRODUCTION

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## PCN-1001 general description

The PCN-1001 is a compact and autonomous device that uses a stereoscopic vision technology to count passengers entering and exiting the doorways of transportation vehicles, such as buses and trains. It can also be used to count people entering and exiting gates in cinemas, amusement parks, shopping centres, etc.

The PCN-1001 has been developed to be connected to an RS485 network.

The stereoscopic cameras installed on the front panel (also called sensors) capture images of the area below the device (called the Detection area); the infrared LED emitters allow for reliable operations in any type of lighting condition.

The PCN-1001 analyse the Detection area, and when a person enters or leaves, the incoming or outgoing values are stored accordingly, along with time and date information.

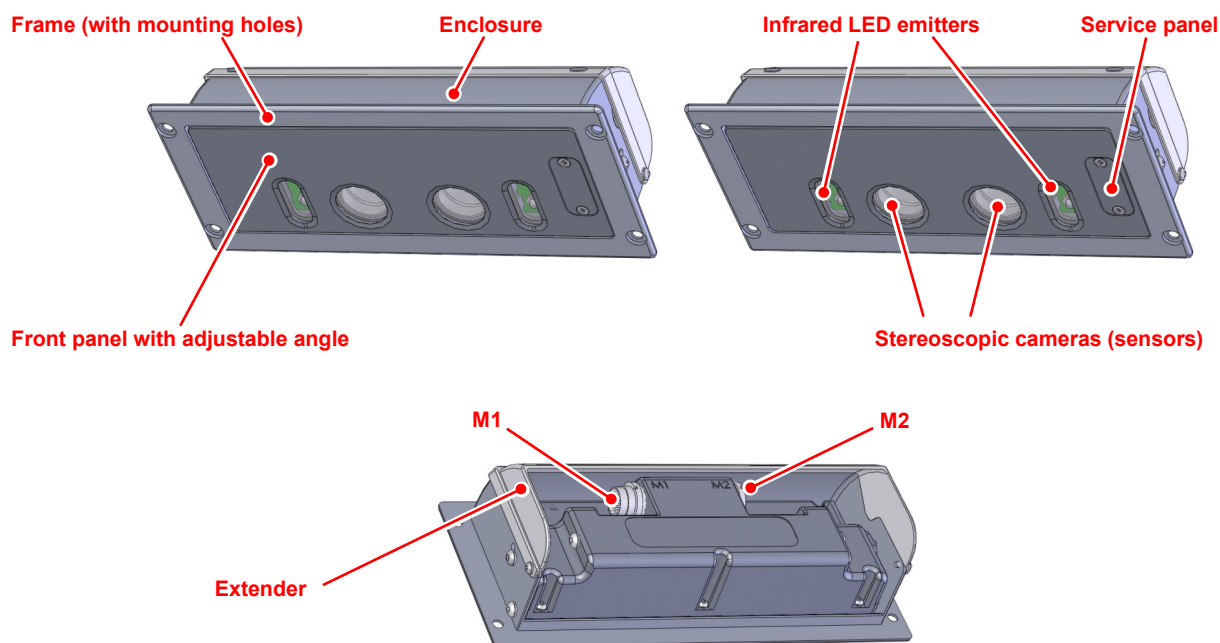


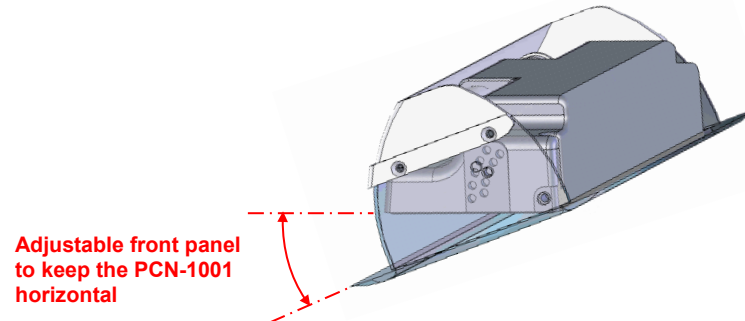
Figure 1. PCN-1001 front and rear

The stereoscopic cameras capture images of the area below the device (Detection area); the built-in high luminosity infrared LED emitters allow for reliable operations in any type of lighting condition.

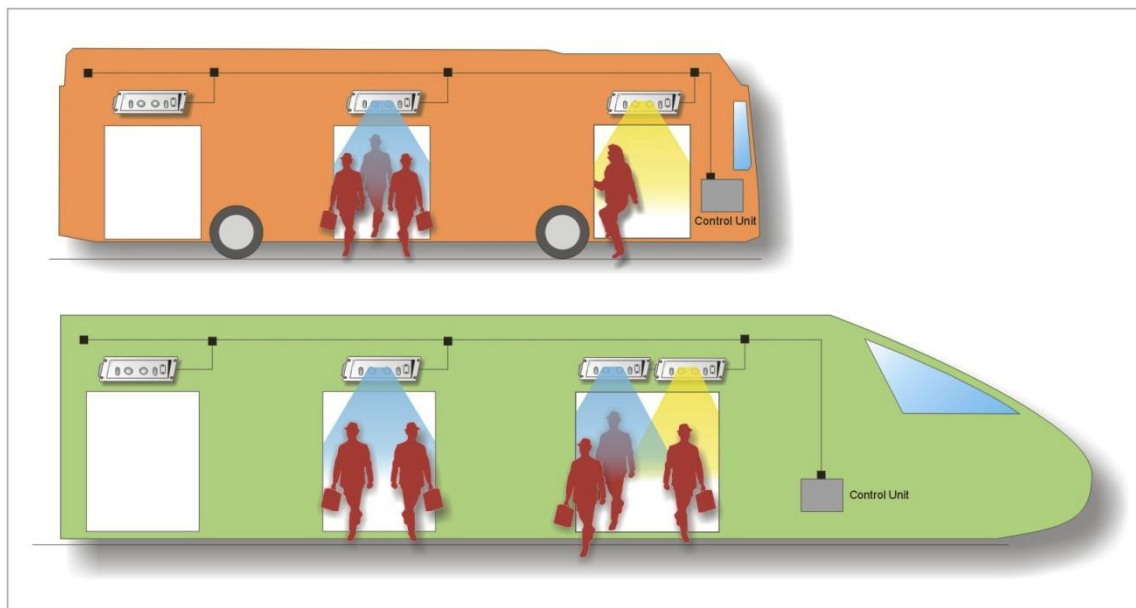
The PCN-1001 analyses any objects moving within the Detection area, considering height, shape and direction. After determining if an object is a person entering or leaving, the incoming or outgoing values are stored accordingly, along with time and date information.

This information is immediately available via RS485 or downloaded at a later date for analysis.

The PCN-1001 has to be installed so that the front panel is placed horizontal to the floor. To achieve this, the angle between the front panel and the enclosure can be adjusted from 0° to 35° (up to 45° using the Extender: the Extender also increases the protection of the rear side). Thanks to these characteristics the PCN-1001 can be mounted in a variety of locations, even on non-horizontal surfaces.



Many PCN-1001 systems can be installed in a vehicle, working stand-alone or networked together with a vehicle server - the Control Unit - that can pre-process, store, and upload information from all the passenger counters.





## Main features

| FEATURE                          | DESCRIPTION   |
|----------------------------------|---|
| <b>APPLICATION</b>               | Automatic passenger counting (accuracy: 98%; precision: 99%)  |
| <b>TECHNOLOGY</b>                | Stereoscopic image capturing  |
| <b>INTERFACES</b>                | <ul style="list-style-type: none"> <li>• RS485</li> <li>• Insulated Digital I/Os</li> <li>• USB 1.1 (service)</li> </ul>  |
| <b>CONNECTORS</b>                | <ul style="list-style-type: none"> <li>• M1: 12-pin male circular</li> <li>• M2: 12-pin female circular</li> </ul>  |
| <b>MECHANICAL</b>                | IP65 sealed magnesium alloy enclosure   |
| <b>POWER SUPPLY</b>              | 9 - 36 VDC  |
| <b>MAXIMUM POWER CONSUMPTION</b> | <ul style="list-style-type: none"> <li>• 3.2 W with infrared illuminators turned OFF</li> <li>• 7.8 W with infrared illuminators turned 100% ON</li> </ul>  |
| <b>STANDARDS</b>                 | <ul style="list-style-type: none"> <li>• Automotive E24: ECE ONU Reg.10</li> <li>• Fire protection: EN 45545</li> <li>• EMC emissions: EN 50155 / EN 50121 / EN 50011</li> <li>• EMC immunity: EN 50155 / EN 50121 / EN 61000</li> <li>• Environmental: EN 50155</li> <li>• Vibrations &amp; shocks: EN 50155 / EN 61373</li> </ul> |
| <b>OPERATING TEMPERATURE</b>     | EN 50155 Tx   |
| <b>WEIGHT</b>                    | 0.6 kg  |
| <b>DIMENSIONS (mm)</b>           | <p>FRAME</p> <ul style="list-style-type: none"> <li>• Height 100 x Width 230 x Thickness 3</li> </ul> <p>REQUIRED CUT-OUT</p> <ul style="list-style-type: none"> <li>• Height 82 x Width 209 x Depth 42 (frame at 0°) to 70 (frame at 45°)</li> </ul>   |
| <b>MTBF</b>                      | > 500000 hours  |
| <b>ACCESSORIES</b>               | Starter Kit, Configuration software   |

## Front interfaces. The service panel

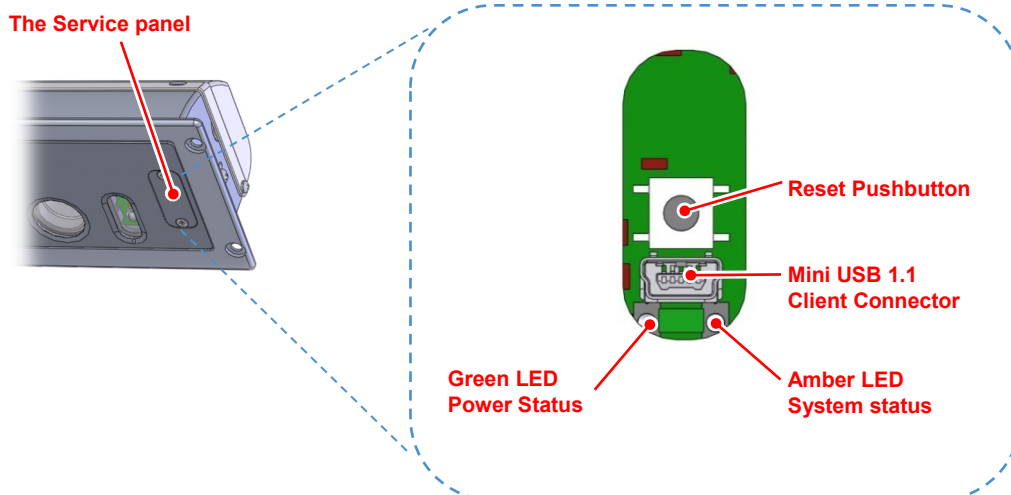
A Service panel, located on the front of the PCN-1001, gives access to some interfaces used for configuration, maintenance, and development of applications.

The service panel is held in place by 2 Torx M3 \* 6 screws, these should be removed using a Torx T9 screwdriver



### NOTE

The PCN-1001 should not be used for extended periods of time with the service plate removed. Doing so will cause dust and other particulates to enter the system, causing degradation to the optics. If it is necessary to have extended access to the Mini-USB connector, take appropriate precautions to stop any particulates from entering.



### LED indicator assignment

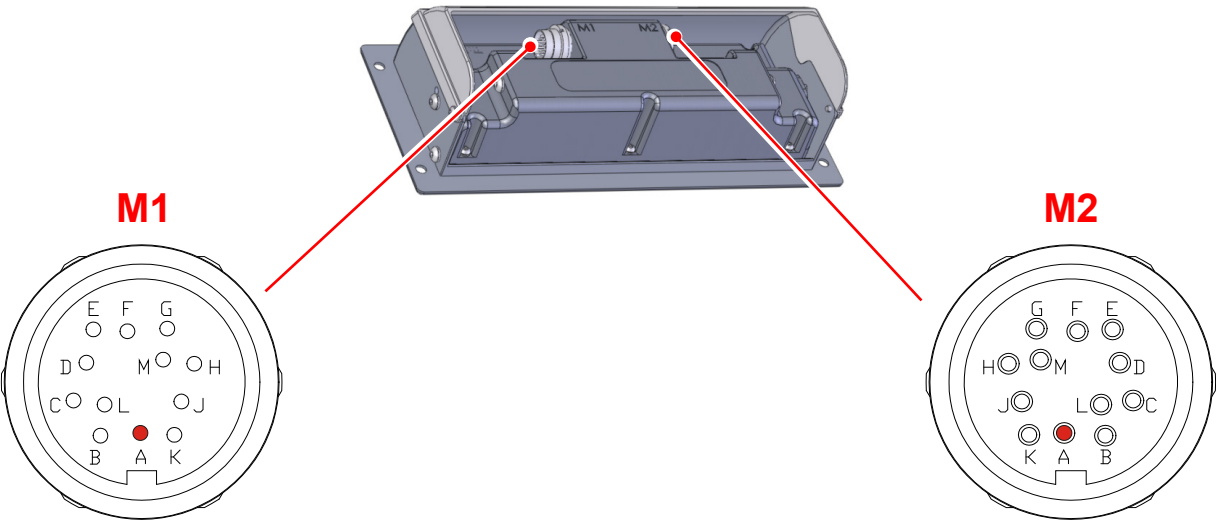
| LED COLOUR | MEANING       | LED STATUS  |
|------------|---------------|---|
| Green      | Power status  | ON: PCN-1001 turned ON<br>OFF: PCN-1001 turned OFF                            |
| Amber      | System status | Blinking: Boot in progress<br>ON: Boot finished and PCN-1001 ready to operate |

### Notes about the Mini USB port

This is a standard Mini-USB type “B” 1.1 client port and is used to connect the PCN-1001 to a Host PC for maintenance and configuration.

## Rear interfaces

The PCN-1001 has the following interface connectors on the rear panel:



**CONNECTOR CHARACTERISTICS:**  
Type: 12-pin male circular connector  
P/N: Lumberg 031512

**COUNTERPART CHARACTERISTICS:**  
Type: 12-pin female circular connector  
P/N: Lumberg 032212

| PIN | SIGNAL            |
|-----|-------------------|
| A   | Power supply +    |
| B   | Power supply -    |
| C   | Digital IN 1 +    |
| D   | Digital IN 1 -    |
| E   | Digital OUT 1 V+  |
| F   | Digital OUT 1     |
| G   | Digital OUT 1 GND |
| H   | RS485_1 GND       |
| J   | RS485_1 +         |
| K   | RS485_1 -         |
| L   | Reserved          |
| M   | Reserved          |

**CONNECTOR CHARACTERISTICS:**  
Type: 12-pin female circular connector  
P/N: Lumberg 030512

**COUNTERPART CHARACTERISTICS:**  
Type: 12-pin male circular connector  
P/N: Lumberg 033212

| PIN | SIGNAL            |
|-----|-------------------|
| A   | Reserved          |
| B   | Reserved          |
| C   | Digital OUT 2 V+  |
| D   | Digital OUT 2     |
| E   | Digital IN 2+     |
| F   | Digital IN 2-     |
| G   | Digital OUT 2 GND |
| H   | RS485_WG GND      |
| J   | RS485_WG +        |
| K   | RS485_WG -        |
| L   | Reserved          |
| M   | Reserved          |

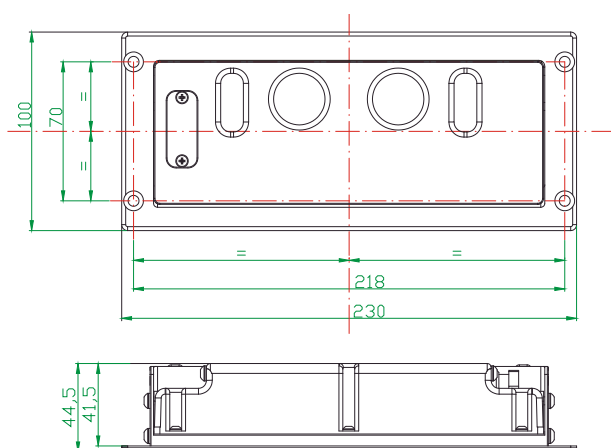
## Mechanical Characteristics

| PCN-1001 FRAME |        |
|----------------|--------|
| Height:        | 100 mm |
| Width:         | 230 mm |
| Thickness:     | 3 mm   |

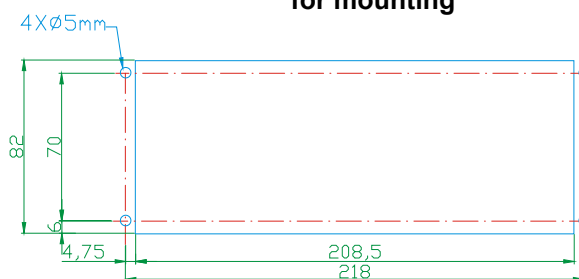
  

| REQUIRED CUT OUT DIMENSIONS |   |
|-----------------------------|---|
| Height:                     | 82.0 mm   |
| Width:                      | 208.5 mm  |
| Depth:                      | 41.5 to 70.0 mm, depending on optical panel angle |

System dimensions



Required cut-out dimensions for mounting



Dimensions are in millimetres



**WARNING!**  
**PROVIDE SUFFICIENT ANCHORAGE WHEN MOUNTING THE PCN-1001.**  
**THIS MUST BE DONE TO ENSURE THAT THE PCN-1001 DOES NOT BECOME DETACHED DURING TRANSIT CAUSING A SAFETY HAZARD.**

## PART 2 – PCN-1001 INSTALLATION PROCEDURE

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# 1 Install the PCN-1001

## 1.1 Preliminary considerations

Ensure that installation height of the PCN-1001 is suitable for your application, taking into consideration:

- the local population's average height
- the width of the gate to detect

The number of PCN-1001 devices required depends on the width of the gate and the installation

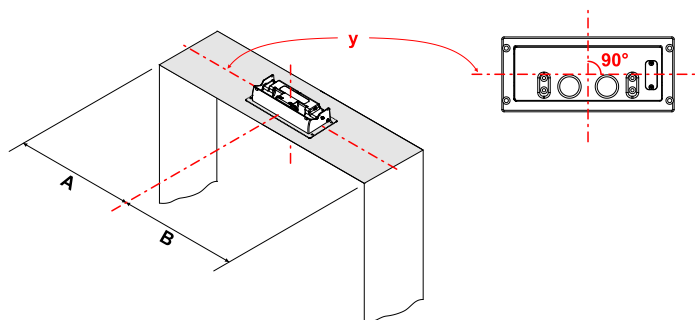
The relation between number of devices, installation height and maximum gate width is showed in the following table:

| INSTALLATION HEIGHT<br>[cm] | MAX GATE WIDTH [cm] |                                 |                                 |
|-----------------------------|---------------------|---------------------------------|---------------------------------|
|                             | Using 1 counter     | Using 2 counters<br>(wide-gate) | Using 3 counters<br>(wide-gate) |
| 180                         | 150                 | 210                             | 270                             |
| 200                         | 180                 | 240                             | 300                             |
| 220                         | 200                 | 260                             | 320                             |
| 250                         | 200                 | 260                             | 320                             |

If the gate is wider than 200 cm you have to connect together two or more devices. This configuration is called "Wide-gate" and requires a master PCN-1001 device and one or more slave PCN-1001 devices:

### 1.1.1 Installing one counter

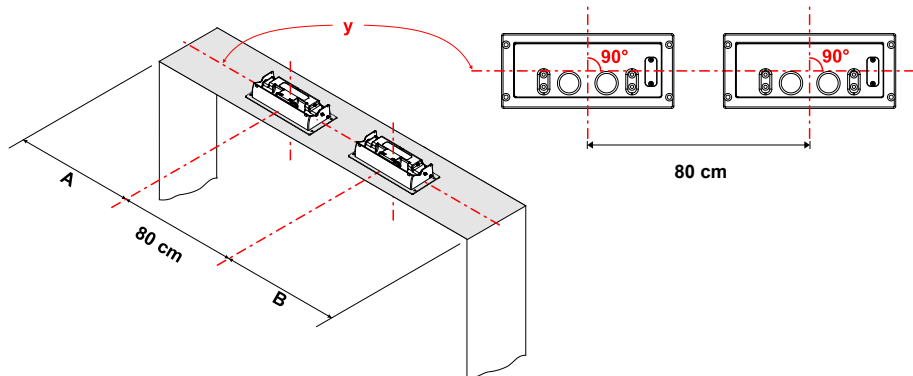
- The Counter should be aligned with respect to the gate
- Ideally the counter should be mounted in the centre of the gate ( $A=B$ ). However if this is not possible, the counter can also be mounted up to 30 cm either side of the centre point.



### 1.1.2 Installing two (or more) counters in Wide-gate configuration

- The counters must be aligned with each other and with respect to the gate
- The distance between the centres of each counter must be 80 cm
- Ideally the group of counters should be mounted in the centre of the gate ( $A=B$ ). If this not possible, the group can also be mounted up to 30 cm either side of the centre point. However, the distance between each counter has always to be 80 cm

For further information about how to connect Mater and Slave devices refer to the document: "DynaPCN Connection Diagrams".

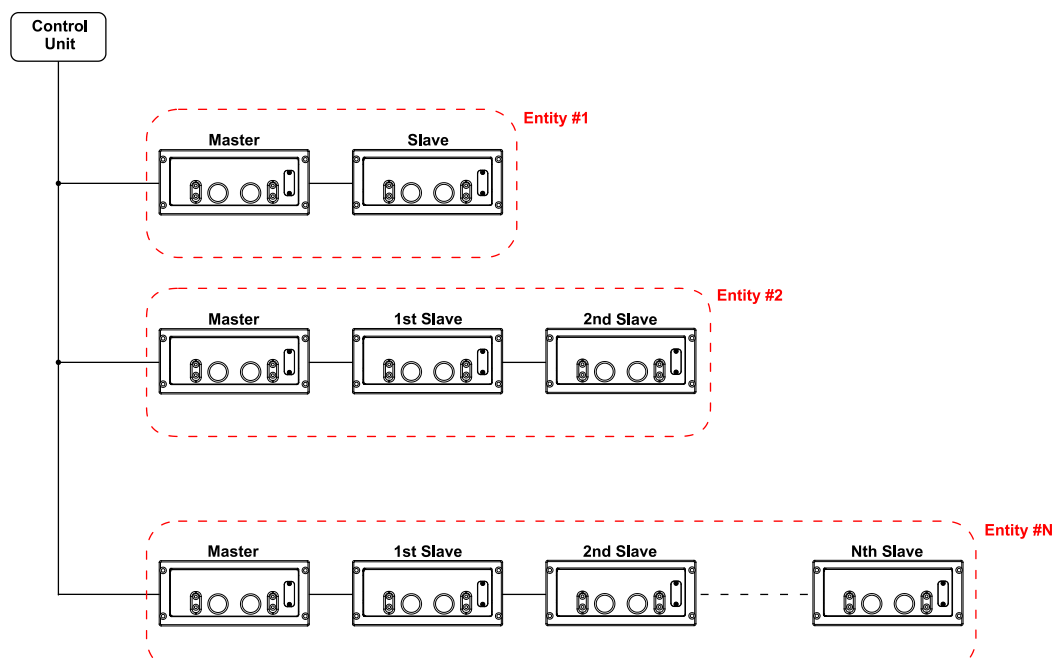


### 1.1.3 Note about devices connected in Wide-gate configuration

The figure below shows different devices in Wide-gate configuration, all managed by the same Control Unit (for example the Host PC).

The Control Unit sees each Wide-gate configuration as a single entity: Entity #1, Entity #2, ..., Entity #N.

While the Master devices can be set with user-defined parameters the Slave devices have to remain with the factory default parameters, as these are configured by the Master device upon power-up.



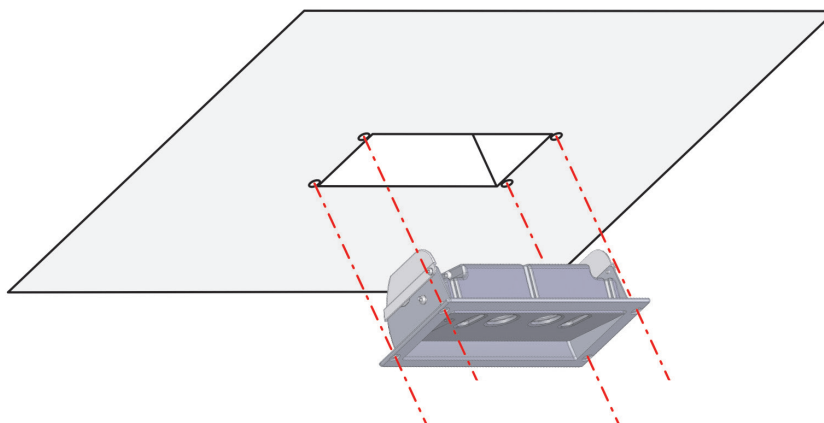


## 1.2 Find the installation area and set it up

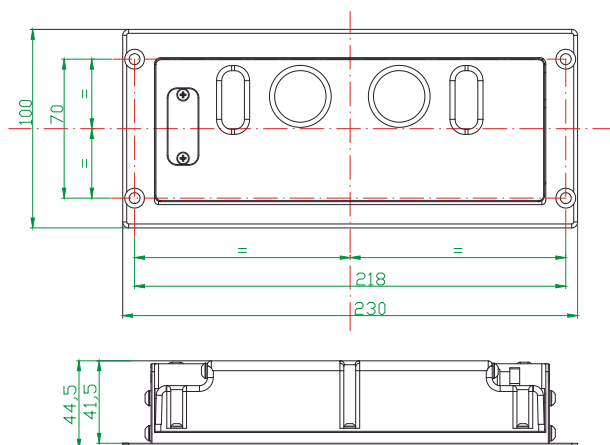
To install the PCN-1001 you usually need to set up the installation area:

1. Make an opening in the ceiling above the door to detect. You can use the “[Cut-out template](#)” on page 99 to simplify this operation
2. Provide a secure anchorage point for the PCN-1001.

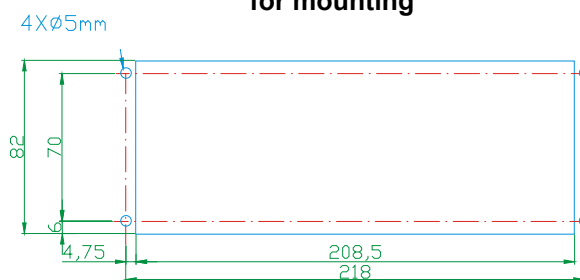
The frame of the PCN-1001 has four mounting holes which allow you to fix the PCN-1001 using four M5 screws. You will have to provide all necessary fixing hardware. This will depend on the location, material, and any applicable regulation. Use anti-vandalism screws to increase security.



**System dimensions**



**Required cut-out dimensions for mounting**



Dimensions are in millimetres

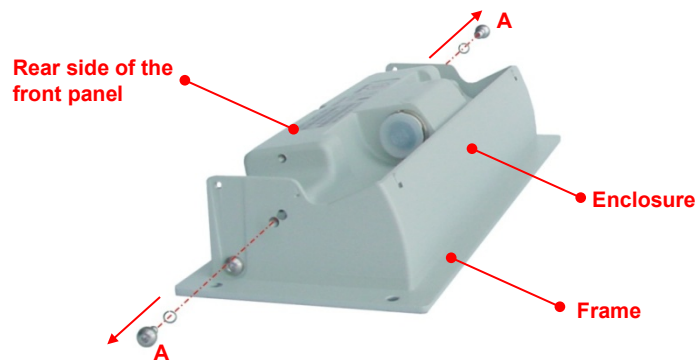
## 1.3 Connect the rear side interfaces and adjust the angle of the front panel

Two connectors, M1 and M2, are available on the rear side of the PCN-1001; these are used to connect the PCN-1001 to the vehicle data bus or to use a Wide-Gate configuration.

Two M4 x 6 stainless steel hexagonal head screws and two split washers (A) keep fixed the angle between the front panel and the frame.

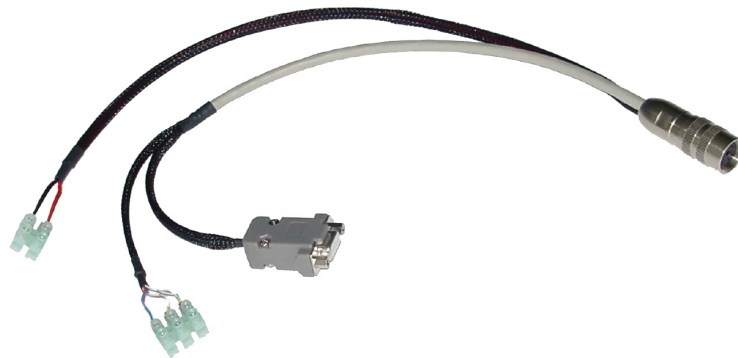
### 1. Loosen the front panel to simplify the cabling procedure:

1. Keep the PCN-1001 with the rear side facing up
2. Using a hexagonal 2.5 mm (7/64") key/driver remove the lateral locking screws and washers at each end (A)



### 2. Prepare the connection cable for power supply and for RS485 connection

1. Prepare a cable to supply power to the PCN-1001 and to connect M1 to a RS485 network.  
As option is possible to use the E14-35-12-00 (Multifunction cable 1) contained in the DYPCN-10-01-00-DK0 Development kit<sup>1</sup>

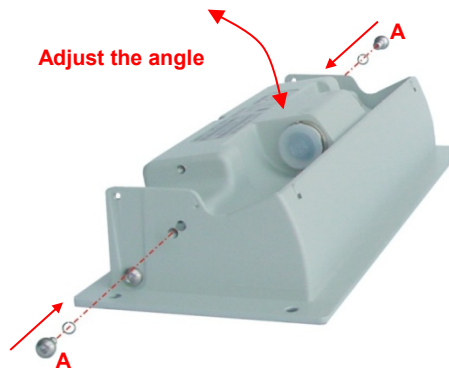


2. Set up a DC power source to meet the PCN-1001 power requirements:
3. Make sure this DC power source is turned OFF

<sup>1</sup> For further information about how to connect the PCN-1001 refer to the document: "DynaPCN Connection Diagrams"

### 3. Adjust the angle of the front panel and secure the front panel

1. The front panel should be as horizontal as possible when the PCN-1001 is in its final installed location. Adjust the angle between the front panel and the frame of the PCN-1001. For further information refer to “[Note for mounting the front panel with angles higher than 35°](#)” paragraph on page 93
2. Secure the front panel by reinserting and tightening the two locking screws and washers at each end (A)



#### IMPORTANT NOTE!

Once the PCN-1001 is installed, the angle of the front panel cannot be modified and the rear connectors cannot be accessed without removing the entire PCN-1001 from the ceiling.

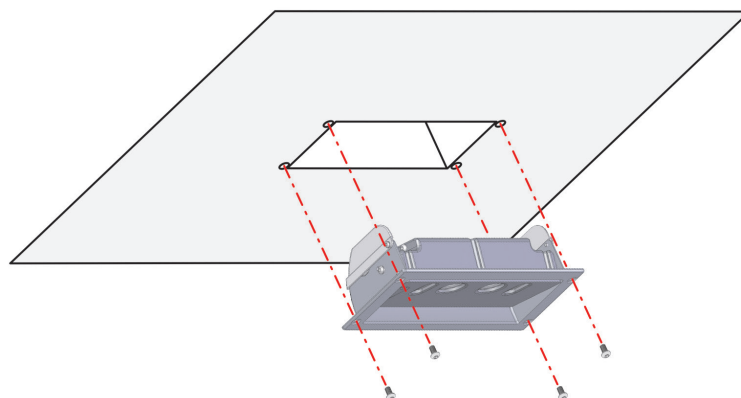
## 1.4 Fix the PCN-1001 to the ceiling

Fix the system in place paying attention to not damage the connections realized in the previous steps.



#### WARNING!

When mounting the PCN-1001 ensure sufficient anchorage in order to firmly fix it to the ceiling. This will avoid any hazardous potentially situations (i.e. dropping down) during normal service. If the PCN-1001 is used within transportation vehicles and it is not firmly fixed, its steadiness may be affected by vibrations or other influences typical of transportation vehicles. This may cause counting errors.



## 2 Configure the network between PCN-1001 & Host PC

### 2.1 Turn on the PCN-1001 power

1. Enable the DC power supply output
2. The PCN-1001 turns ON: the green LED turns ON
3. The PCN-1001 starts to boot: the amber LED blinks
4. When the PCN-1001 is ready to operate both the green and amber LED indicators will be ON (not blinking)

### 2.2 Connect the PCN-1001 with the Host PC

1. Make sure both the PCN-1001 and the Host PC are turned on and ready to operate before connecting them together
2. On the Host PC, Download and unzip the PCN-1001 demo tools
  - a) Download the "PCN-1001 demo tools" from [www.eurotech.com/download](http://www.eurotech.com/download)  
You will receive a file named "pcn-1001-demo-xxxxxxx.zip"
  - b) Unzip the received file
  - c) Unzip the "Eurotech.zip" file contained within the "pcn-1001-demo- xxxxxxxx" folder

Note: xxxxxxxx will be the latest revision number

3. Connect the PCN-1001 with the Host PC
  - a) Locate:
    - the standard Mini-USB type "B" connector under the service plate of the PCN-1001
    - a free standard USB type "A" connector on the Host PC
  - b) Use a Male Mini USB type "B" to Male USB type "A" cable to connect the Mini USB port of the PCN-1001 to the USB port of the Host PC (you can also use the USB - MiniUSB cable contained in the development kit)

#### 2.2.1 If you are using Windows XP

1. Once the USB connection has been established the Host PC will detect the new hardware and display the following message: "Found New Hardware"
2. Shortly after, the Window "Found New Hardware Wizard" will start
3. Select "No, not at this time" and click "Next"
4. Select "Install from a list or specific location (Advanced)" and click "Next"
5. Click "Browse" to the PCN-1001 drivers that have been created when you have extracted the zip
6. The hardware wizard will find the file "linux.inf"; click "Open"
7. Select "OK" in the screen that will appear
8. Click "Next" in the screen that will appear
9. The hardware wizard will now install the driver. Select "Finish" in the screen that will appear
10. The installation procedure will start. Follow the instructions that will appear on the Host PC.
11. Windows will automatically find and install the drivers that are located in the path: \drivers\win2000

#### 2.2.2 If you are using Windows 7 or later

1. Install the "RNDIS Ethernet Gadget"  
Once the USB connection is established the Host PC detects the new hardware, but it cannot find the

new driver for the “RNDIS Gadget”.

You have to install the RNDIS Gadget manually using the following procedure:

- a) Have access to “Device Manager”
- b) Search for “RNDIS Ethernet Gadget”. It should have an “!” stating the failed installation
- c) Update the “RNDIS Ethernet Gadget” using the file “linux.inf” located in the “Eurotech” folder (the path will have a name like: “pcn-1001-demo-2.3.11.4\Eurotech\Eurotech\PCN-1001\2.3.11.4”)

2. The installation procedure starts.  
A new LAN is created.

## 2.3 Verify the network on the Host PC

1. Open the “Network Connections”. A dialog-box will appear
2. Double-click on the appropriate “Local Area Connection”, in the example above we have named the connection “PCN-1001” for clarity
3. The “Status” dialog box will appear
4. Click on the “Properties” button
5. A “Properties” dialog box similar to the one on the right will appear
6. Ensure that the following components are installed:
  - Client for Microsoft Networks
  - Internet Protocol (TCP/IP)

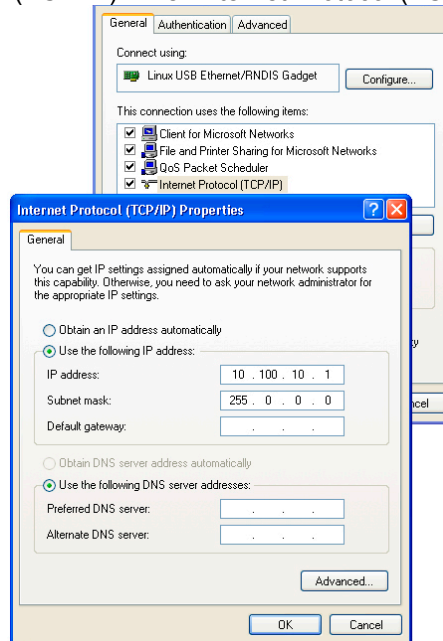


**Note:**

- If any of the components listed in step 6 are missing, add them before proceeding any further.
- If in any doubt, contact your system administrator for further instructions.

## 2.4 Configure the TCP/IP Properties

1. Double-click "Internet Protocol (TCP/IP)" The "Internet Protocol (TCP/IP) Properties" dialog box will appear.



2. Select "Use the following IP address" radio button
3. In the "IP address" field enter the following:  

|    |   |     |   |    |   |   |
|----|---|-----|---|----|---|---|
| 10 | . | 100 | . | 10 | . | 1 |
|----|---|-----|---|----|---|---|
4. In the "Subnet mask" field enter the following:  

|     |   |     |   |     |   |   |
|-----|---|-----|---|-----|---|---|
| 255 | . | 255 | . | 255 | . | 0 |
|-----|---|-----|---|-----|---|---|
5. Click on the "OK" button of each Dialog Box" until all are closed.

### NOTE:

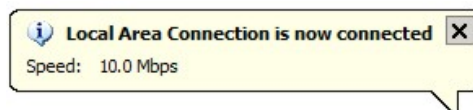
**By default the IP address of the PCN-1001 is [10.100.10.100]**

The Host PC network IP address can be altered to meet the end users requirements; the first field must be 10, the last three fields should be numbers ranging from 0 to 254.

The Host PC address must be different from the PCN-1001 address. In this case, you cannot insert [10.100.10.100] as the connection between the two systems would not function.

If in any doubt, contact your system administrator for further instructions.

6. A message similar to the following should appear according to the OS installed on the Host PC when the PCN-1001 has successfully connected:



## 2.5 Configure the Host PC firewall

**WARNING!**

If the host PC has a firewall running, the following ports **MUST** be open. If not, even if the PCN-1001 is properly connected no image will appear within the WinClient.

| PORT | PROTOCOL | DIRECTION |
|------|----------|-----------|
| 5400 | TCP      | ◄►        |
| 5402 | UDP      | ◄         |
| 5403 | UDP      | ◄         |

### 3 Use WinClient to network PCN-1001 & Host PC

“**WinClient**” is a Graphical User Interface (GUI) that allows you to configure/debug the PCN-1001. The *WinClient* software has been created to access and configure a single PCN-1001 at a time.

**Before proceeding, make sure you have already installed WinClient on your Host PC. If not please refer to “[Download the software](#)” on page 43 for further details.**

After the PCN-1001 has been turned on and properly connected, the *WinClient* has to detect it. In this way the PCN-1001 and the Host PC will form a network. Follow these steps to detect the PCN-1001.

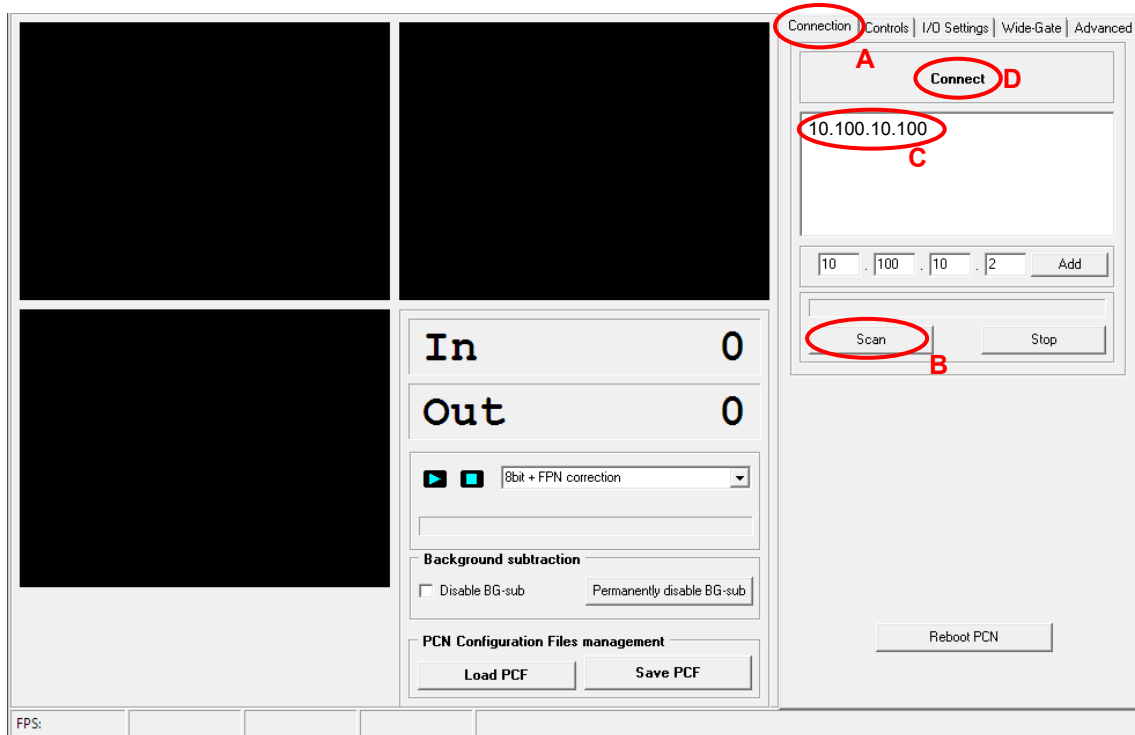


**NOTE:**

If the Host PC network has been setup correctly, when you open the *WinClient* you will see the next available address in the IP Add dialog boxes.

For example if the Host PC Network IP address is [10.100.10.1] the Add dialog boxes will display [10.100.10.2]; this is a good sign that the network has been correctly configured and is functional.

1. Select the "Connection" tab (A). Click the “Scan” button (B) and select the address of the PCN-1001 when it appears (C)
2. Click the “Connect” button (D). Now the PCN-1001 is networked to the Host PC



**NOTE:**

If WinClient does not identify the IP address of the PCN-1001 automatically (e.g.: 10.100.10.100) you may need to insert it manually

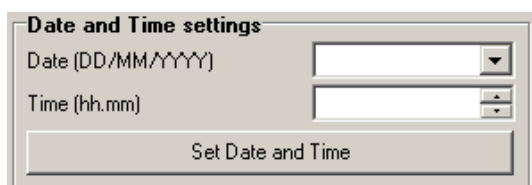


## 3.1 Set the main parameters in the “Controls” tab

The “Controls” tab allows you to change the main settings of the PCN-1001 in order to obtain a good resolution on windows 1, 2 & 3.

Any modifications to the settings will be automatically saved to the internal flash memory of the PCN-1001 and takes immediately effect (a reset is not needed).

### 1: Set the “Date and Time settings”



Displays and allows you to set the system time and date.

#### Set date and time correctly!

This is extremely important especially in stand-alone installations where the user periodically downloads data via the USB using the “Save Records” feature.

### 2: Set the “Light intensity”



Leave the checkbox unchecked.

#### For installations within buildings:

In these kinds of installation, it is assumed that the environment has a constant illumination.

It may be best to try several settings to find the one that best works for your individual requirements.

#### For on-board installations:

Slide the bar completely to the right to put the light intensity to maximum.

This will increase the counting accuracy even in installations where the environmental lighting conditions are always changing and can suddenly vary.

### 3: Set the “In/Out direction”



Be careful to set the direction for incoming and outgoing people correctly. The best method is to have a person enter the door, and verify that the correct counter In or Out is updated.

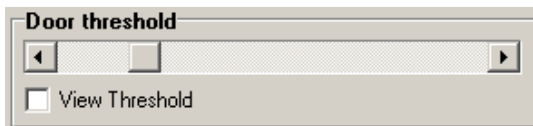
Changing the direction will reset the in/out counters.

#### 4: Set the “Door width”



Slide the bar to set the door width.

#### 5: Set the “Door threshold”

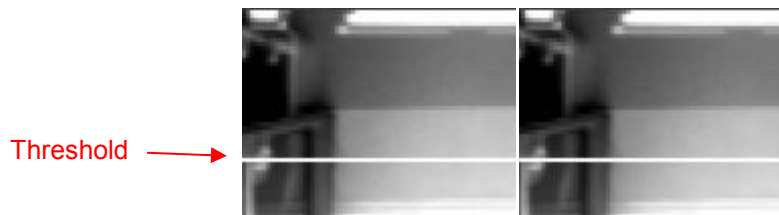


Together with “Scene background” (point 7), “Door threshold” is one of the two most important parameters that has to be set properly to increase accuracy.

During the tracking process, the two counters are incremented only if a person enters the detection area, crosses the door threshold and then exits from the detection area on the opposite side.

By default, the threshold is placed at row 60 (the image height is 120 rows). The position of the line can be set between row 30 and row 89.

In each visualization mode, except for “Tracking”, flagging the “View Threshold” checkbox will display the current threshold (a white horizontal line) in Windows 1 and 2.



#### Guidelines to find the best threshold position:

- Place it in a way that any person entering or exiting has to cross it.
- Place it away from high reflective surfaces (i.e. the steps on a bus/train). If the detection area includes also a portion outside the transportation vehicle, the door threshold should not be set outside.
- Place it away from door-opening mechanisms
- It should be placed in the middle of the detection area, which if the PCN-1001 has been installed correctly above the door, should correspond to a central position of the “Door threshold” slide bar

If a door is intended to be used in a single direction, for example “in only” or “out only”, it may be useful to move the threshold towards the exit edge of the detection area.

## 6: Use the “Scene background” button to acquire and store the background

Scene background

Together with “Door threshold”, “Scene background” is the most important parameter that has to be properly set to obtain a reliable counting process.

The acquisition and storage of the background is a fundamental and sensitive issue.

A bad background acquisition can seriously affect the counting process.



### IMPORTANT NOTE:

Acquire the background in the following circumstances:

- Once the PCN-1001 has been installed
- When the PCN-1001 has been relocated
- If the background has altered

### Pay attention to the following issues:

- The background has to be taken with no foreign removable objects in the detection area
- The background has to be taken with doors open, especially if the doors would block the PCN-1001s' field of view as frequently occurs within buses or trains
- Lighting of the detection area should be diffused as much as possible. No spot lighting (e.g. solar reflections or strong lighting) should be present in the detection area during background acquisition
- Highly reflective, geometric structures situated on or near the floor, such as the metallic parts of a door mechanism, which cause extreme patterns of light and darkness when illuminated by strong light (e.g. direct sunlight or directional halogen lighting) could lead to flawed distance measurements. To avoid performance degradation due to these effects the structures and any highly reflective surfaces should be avoided as much as possible in the detection area
- Metallic or shiny objects (such as handles, bars, glass, etc.) should not cover a significant part of the detection area. If this is not avoidable, the reflectivity of these items should be reduced by means of non-reflective materials or modifying the “No Tracking Zone”
- If necessary, use the features of the “No Tracking Zone” panel in “The “Advanced (1/2)” tab” (page 68). The “No Tracking Zone” feature allows you to define rectangular zones in the detection area where tracking will not be performed. This feature can be used to mask surfaces that are very reflective or with spot lighting

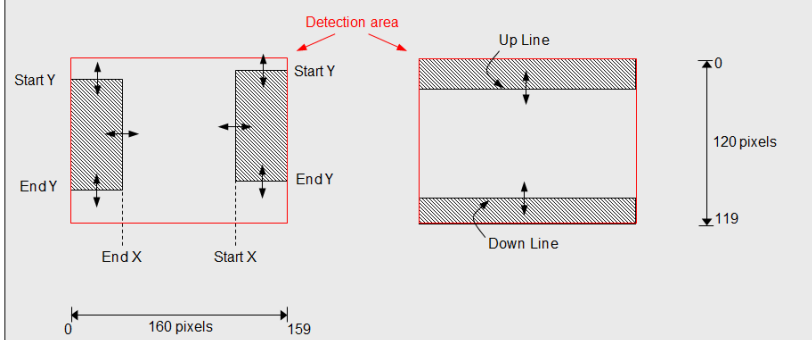
### RANGES:

End X = pixel 0 to 70  
 Start X = pixel 159 to 91  
 Start Y = pixel 0 to 119  
 End Y = pixel 119 to 0

Up Line = pixel 0 to 59  
 Down Line = pixel 119 to 60

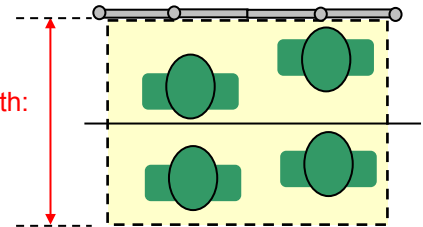
### Example:

The picture below shows the detection area with no tracking zones (represented as dashed areas):



- Exclude as much as possible the area outside the transportation vehicle
- Verify that all the entrance area is detected properly. Make a person move under the PCN-1001s and verify the correct detection
- The PCN-1001 can't track more than 10 people at a time. In particularly crowded conditions, i.e. on-board buses, 10 people can be compressed in less than  $1 \text{ m}^2$ , so the detection area should be smaller. In these conditions a depth of 70~90 cm at floor level is fine to guarantee a good tracking of people.

Suggested depth:  
70~90 cm



#### Follow these steps to save the background:

1. Connect the PCN-1001 by pressing the "Connect" button
2. Select "8bit Disp. + median + FPN + ODC" in the drop-down list. In this way Windows 1 and 2 will display the separated images as seen by the two cameras, subtracting the Fixed Pattern Noise (FPN) and the Optical Distortion Correction (ODC). Window 3 will display the disparity map and a median filter will be applied for reducing noise
3. Press the "►" button.
4. **Ensure the doors of the gate are open!**
5. **Check that the PCN-1001 is correctly set up!**  
This means that in windows 1 and 2 you must see the scene as captured by the two cameras while in window 3 the image has to be completely black or dark grey-scaled.  
If for any reason it does not appear dark or any white spot appears, this will be recognised as one or more objects present in the detection area. A background stored in these conditions may reduce counting accuracy during the tracking process. Refer to the "**Pay attention to the following issues:**" paragraph above for possible solutions
6. Press the "■" button
7. Select the "Controls" tab and click the "Scene Background" button. Ensure that window 3 remains completely dark or dark grey-scaled until the process has completed. If not restart from step "5"

Wait for the progress bar to complete. When completed, the "Scene background Saved!" dialog box will be displayed.



#### NOTE:

Pay careful attention that the USB cable or any part of your body, especially feet, are not visible in the detection area

## 4 Use WinClient to test the tracking of people

The “tracking” process consists of a 3D image displayed in window 3 that is the differences between the images from the left and right cameras.

The image in window 3 is also called “Disparity map”. As objects become closer to the cameras they will appear lighter in colour.

To verify the tracking process:

1. Select “Tracking” in the drop-down list
2. Click the “►” button
3. Check if the images in window 3 are correctly displayed when somebody is enters into the detection area.

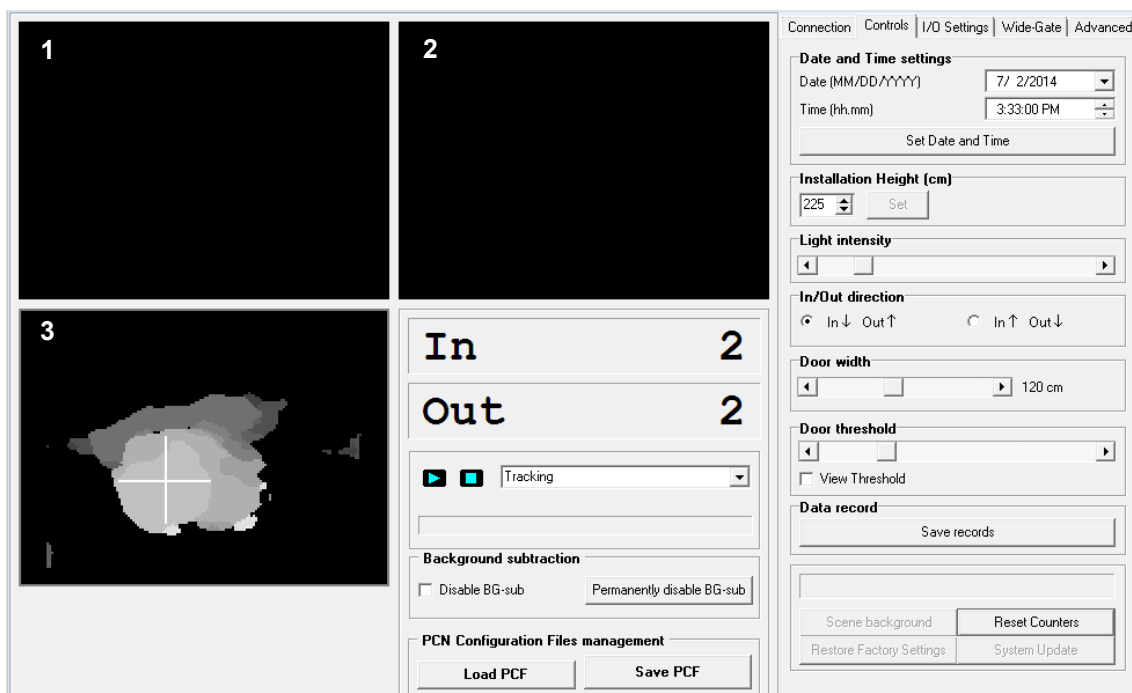


Figure 2. The tracking process

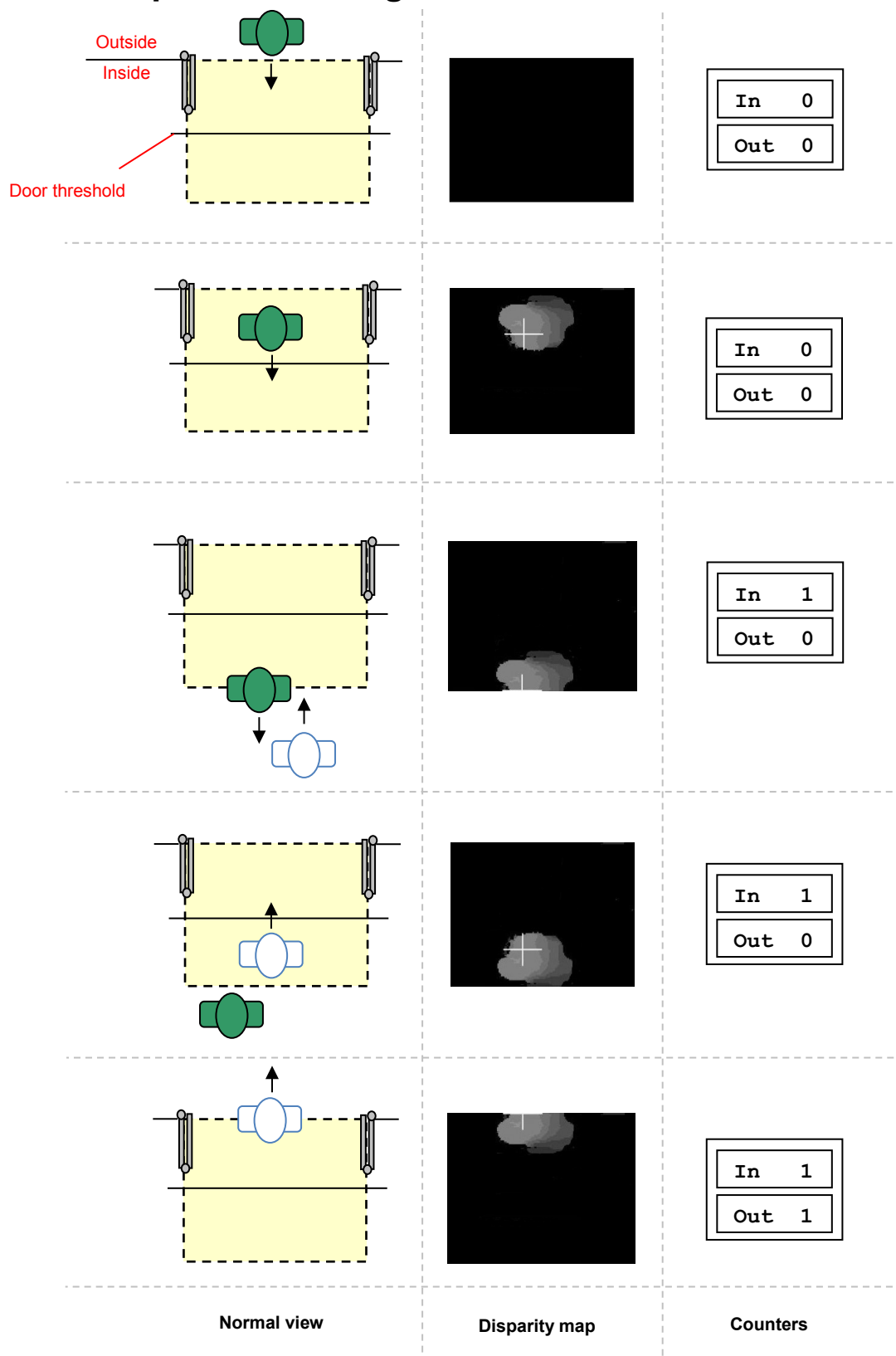
To close the *WinClient* software and stop the counting process:

1. Click the Disconnect button in the Connection Tab to disconnect the DynaPCN
2. Close WinClient

To close the *WinClient* software and continue counting:

1. Close WinClient. The DynaPCN will continue counting according to the user’s configuration.

## 4.1 Example of counting



### Remember:

During the tracking process, the two counters are incremented only if a person enters the detection area, crosses the door threshold and then exits from the detection area on the opposite side.

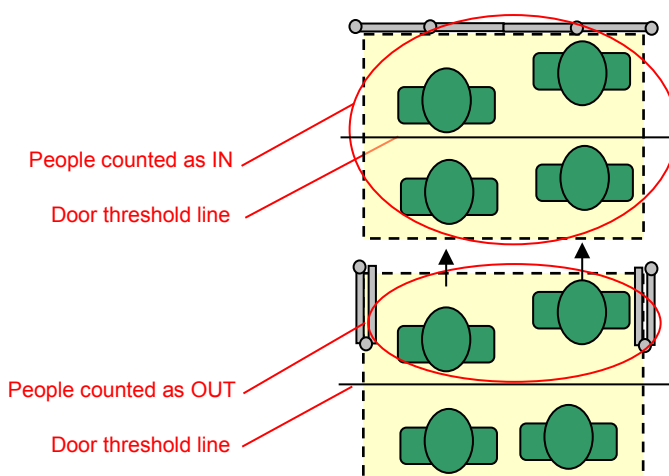
## 4.2 How the threshold works when using digital inputs

**NOTE:**

Refer to '[Notes about the Digital I/O interface](#)' on page 61 for further information about the digital inputs.

When the counting process is disabled (i.e. when the door is closed), people remaining anywhere in the detection area will be counted as IN, and the counter will be amended accordingly.

When the counting process is enabled (when the door is open), every person already within the door threshold line and the portion of detection area facing the door, will be counted as OUT if they leave the detection area; again, the counter will be amended accordingly.

**WARNING!**

The commutation time of digital inputs is extremely important because any propagation delay in the signal may affect severely the precision of the counting. The digital inputs should enable the PCN-1001 as soon as the door starts opening and should disable it after the door is closed completely.

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## PART 3 – THE PCN-1001 SOFTWARE

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## Download the software


You can download the software to use with the PCN-1001 from [www.eurotech.com/download](http://www.eurotech.com/download).

The main software packages to be used with your PCN-1001 are:

- pcn-1001-demo

| Manual Tools Utility Application Notes |   |   |
|--|---|---|
| File                                   | Size  | Description                                       |
| pcn-1001-demo-2.3.11.3.zip             |  (1415 Kb) | Demo tools to manage the PCN-1001 (Rev. 2.3.11.3) |

- pcn-1001-Imgserver

| Manual Tools Utility Application Notes |   |  |
|--|---|--|
| File                                   | Size  | Description  |
| pcn-1001-imgserver-2.3.11.3.zip        |  (66 Kb) | Imgserver program to manage the PCN-1001 (Rev. 2.3.11.3) |



### WARNING!

THE SAME VERSION OF “PCN-1001-DEMO” AND “IMGSERVER” MUST BE USED RESPECTIVELY ON THE HOST PC AND ON THE PCN-1001. INCOMPATIBILITIES WILL OCCUR AND THESE WILL CAUSE PROBLEMS IF OLDER AND NEWER VERSIONS OF EITHER THE “PCN-1001-DEMO” OR “IMGSERVER” ARE USED TOGETHER. THE INFORMATION CONTAINED IN THIS DOCUMENT REFER TO RELEASE 2.3.11.5 AND LATER

## The pcn-1001-demo package

Save and unzip the pcn-1001-demo package on your Host PC into a specific folder (e.g. create a “Eurotech PCN-1001” folder).

You will obtain the “WinClient” and the “RS485\_GUI” programs

### The WinClient program

“WinClient” is a stand-alone program that allows you to configure/debug the PCN-1001.

WinClient has been created to access and configure one PCN-1001 at a time.

### The RS485\_GUI program

“RS485\_GUI” is a stand-alone program that can be used to simulate real working conditions where the Host PC or the Control Unit (the main on-board computer, for example a Eurotech DuraCOR system) sends/receives commands via an RS485 connection to/from one or more PCN-1001.

## The pcn-1001-Imgserver

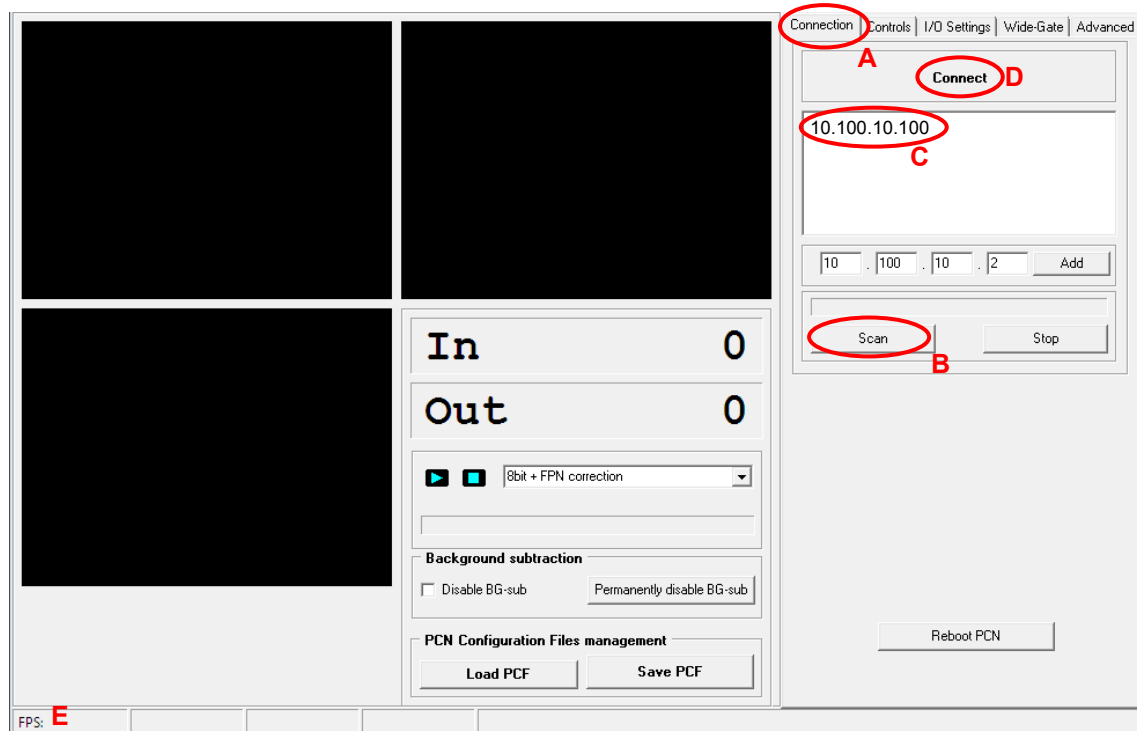
“*Imgserver*” is a daemon program that runs on the PCN-1001, it starts at boot time and performs the people counting tasks. It accepts remote connections using both the RS485 and USB ports.

**The PCN-1001 comes with *Imgserver* ready installed and ready to work.**

When available, new versions of the *Imgserver* can be installed in the following way.

### Update *Imgserver* on the PCN-1001

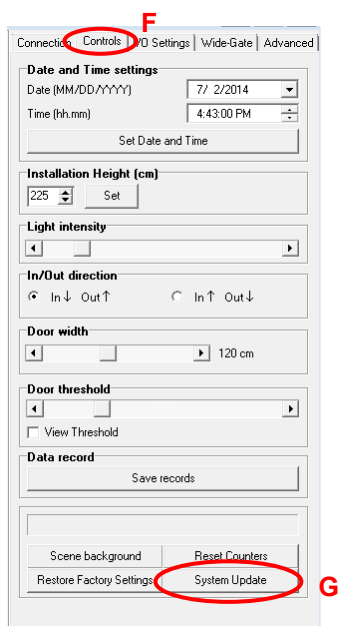
1. Turn ON the PCN-1001. Connect the PCN-1001 to the Host PC via USB. Refer to “[Install the PCN-1001](#)” 23 and “[Configure the network between PCN-1001 and Host PC](#)” on page 28 for further information
2. Run WinClient



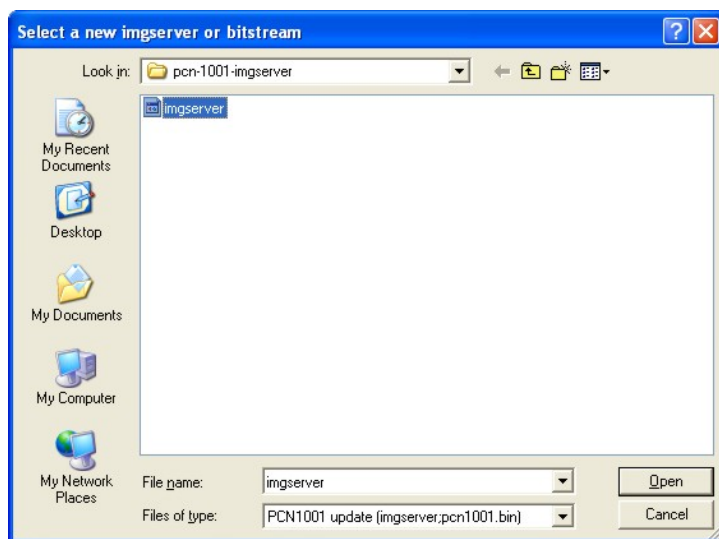
3. Select the "Connection" tab (A) and click the “Scan” button (B).  
Select the address of the required PCN-1001 (C). Click the “Connect” button (D).

When connected, the *Imgserver* version will be displayed on the bottom line (the Status bar; E):  
example: “imgserver v. 2.3.11.5”

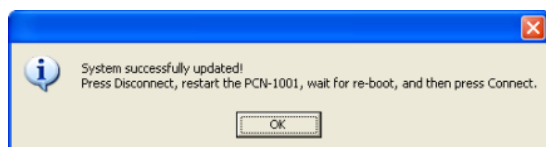
4. Select the "Controls" tab (F) and click the "System Update" button (G)



5. A dialog box appears.  
Open the folder with the latest *Imgserver* file. Select the *Imgserver* file. Click "Open"

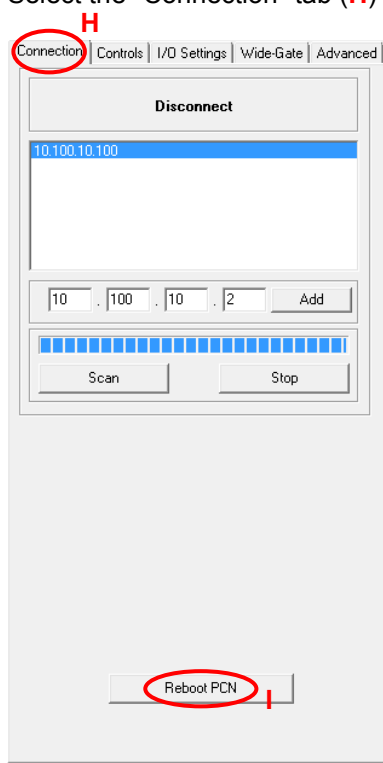


6. The *Imgserver* is updated on the PCN-1001.  
When done the following confirmation message appears:



Click "OK"

7. Select the "Connection" tab **(H)** and click the "Reboot PCN" button **(I)**



8. Close the *WinClient* program
9. Reconnect (as done at steps 3 and 4)
10. Verify that the *Imgserver* has been updated by looking at the versions in the status bar

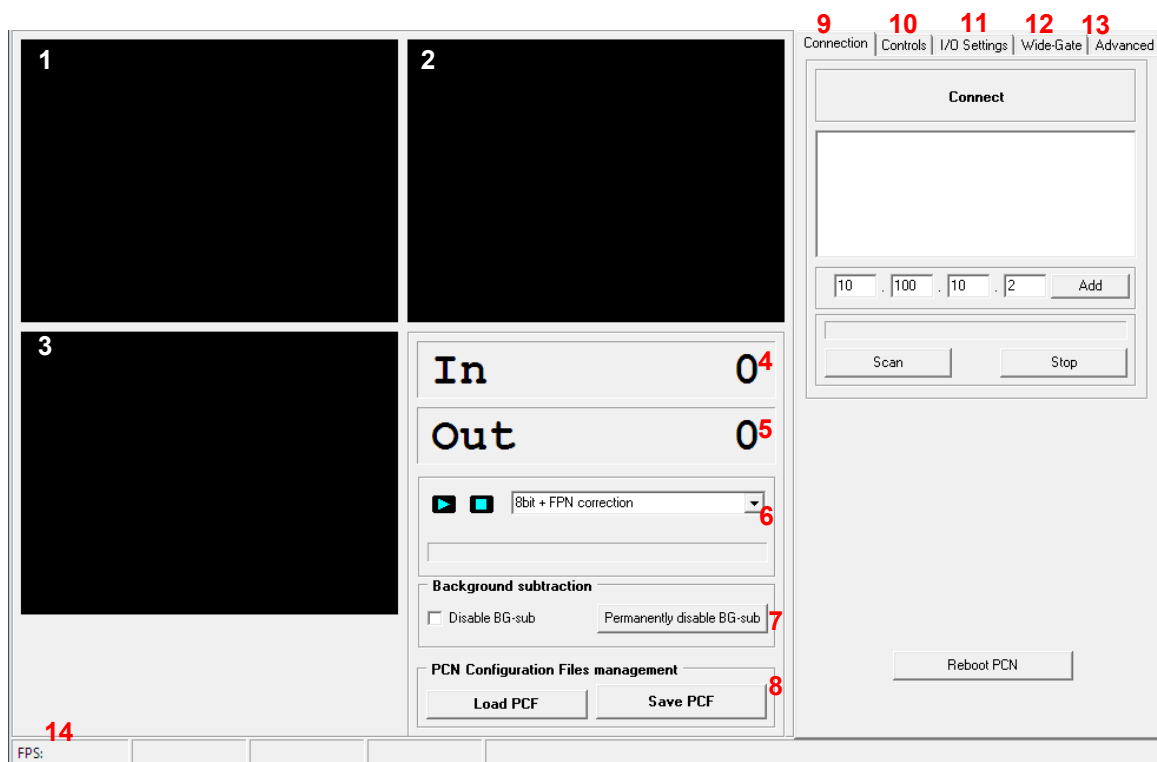
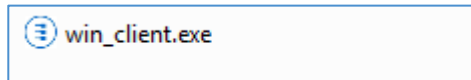
**Note:**

Refer to the download area of [www.eurotech.com](http://www.eurotech.com) to download the most updated software version.

## WinClient functions

Make sure you have properly connected and configured both the Host PC and the PCN-1001 as described in the previous sections

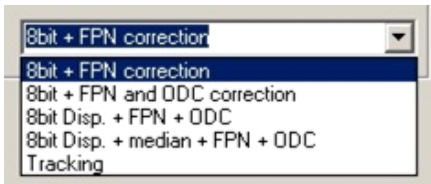
Double-click the *win\_client.exe* icon to run the program



- 1 & 2** Window displaying the left and right images acquired from the individual cameras
- 3** Window displaying the tracking process and the disparity map
- 4** Incoming counter
- 5** Outgoing counter
- 6** Drop-down list
- 7** Background subtraction
- 8** PCN Configuration Files Management
- 9** "Connection" tab
- 10** "Controls" tab
- 11** "I/O Settings" tab
- 12** "Wide-Gate" tab
- 13** "Advanced" tab
- 14** Status bar

## The drop-down list

The drop-down list offers a choice of visualization modalities for the windows 1, 2 and 3:



### 8bit + FPN correction

Windows 1 and 2 will display the separated images as seen by the two cameras, subtracting the Fixed Pattern Noise (FPN)

### 8bit + FPN and ODC correction

Windows 1 and 2 will display the separated images as seen by the two cameras, subtracting the Fixed Pattern Noise (FPN) and the Optical Distortion Correction (ODC)

### 8bit Disp. + FPN + ODC

Windows 1 and 2 will display the separated images as seen by the two cameras, subtracting the Fixed Pattern Noise (FPN) and the Optical Distortion Correction (ODC).  
Window 3 will display the disparity map

### 8bit Disp. + median + FPN + ODC

Windows 1 and 2 will display the separated images as seen by the two cameras, subtracting the Fixed Pattern Noise (FPN) and the Optical Distortion Correction (ODC).  
Window 3 will display the disparity map and a median filter will be applied for reducing noise

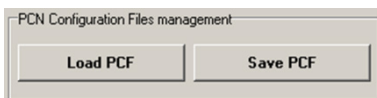
### Tracking

This is the only modality that activates the counting. Window 3 will display the disparity map and a median filter will be applied for noise reduction. Furthermore some white crosses will appear to indicate the detected people and trace their movement

## Start and Stop counting

The Start ("►") and Stop ("■") buttons allow you to respectively start and stop the counting process.

## Manage the PCN Configuration Files (PCF)



This feature is useful when you have several PCN-1001 devices that have to be installed and all will have the same operating conditions (i.e. same door on different buses of the same type).

It allows you to save the current configuration and load it to other PCN-1001 devices without setting each PCN-1001 individually.



### Note:

The PCN-1001 configuration that is going to be saved will contain all the setup parameters except for the "RS485 Setup ID" and "Scene Background".

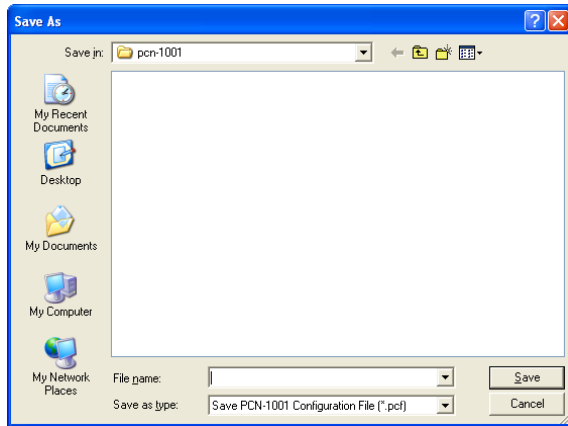


## How to save a PCF

Make sure that the PCN-1001 is not running (click the “■” button)

Click the “Save PCF” button

A dialog box like the following will appear:



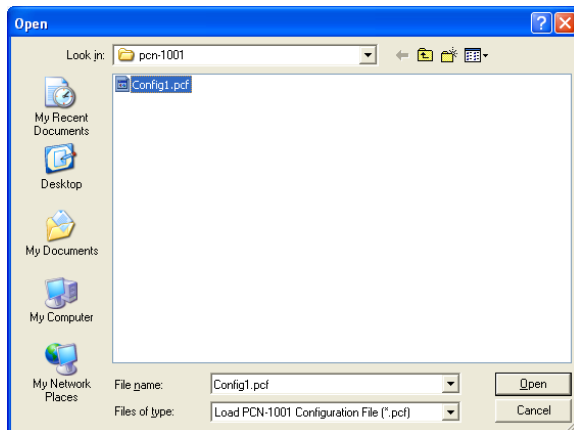
Save the current configuration with a file name (i.e. Config1)

## How to load a PCF

Make sure that the PCN-1001 is not running (click the “■” button)

Click the “Load PCF” button

A dialog box like the following will appear:



Select the proper file name (i.e. Config1) and click “Open”

**NOTE:**

The “Scene Background” must be retaken for each new PCN-1001, even if the background is theoretically the same

## Subtract the background



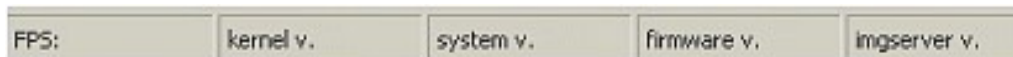
Allows you to temporarily or permanently subtract the background to the scene.

Disabling the background allows you to understand:

- How the acquired background is affecting the counting process
- If it is necessary to acquire a new background

This function can be used when you [Acquire the "Scene background"](#).

## The status bar



When the PCN-1001 is working, the status bar displays the following information:

| Value               | Description  |
|---------------------|--|
| <b>FPS:</b>         | Frames Per Second. The number of images displayed by <i>WinClient</i> every each second. |
| <b>Kernel v.</b>    | The Linux kernel version   |
| <b>System v.</b>    | The Operating system version.  |
| <b>Firmware v.</b>  | The FPGA firmware version.   |
| <b>Imgserver v.</b> | The <i>Imgserver</i> program version.  |

## Notes about images acquisition and FPS

During normal operations (default mode), the PCN-1001 acquires the images at a constant rate of approximately 60 Frames Per Second (FPS).

During configuration, the acquired images are transmitted to the Host PC for visualization. Depending on the Host PCs characteristics and the USB connection, the FPS rate may differ. The value displayed in the bottom left corner of the *WinClient* GUI is the current FPS rate detected by the Host PC. However the real FPS of the PCN-1001 is not affected by these external factors and remains at 60 FPS.

## The tabs

The image displays three side-by-side screenshots of the WinClient software interface, each showing a different tab: Connection, Controls, and I/O Settings.

- Connection Tab:** Features a 'Connect' button, a large empty rectangular area, a row of input fields (10, 100, 10, 2) with an 'Add' button, 'Scan' and 'Stop' buttons, and a 'Reboot PCN' button at the bottom.
- Controls Tab:** Contains 'Date and Time settings' (Date: 7/ 2/2014, Time: 4:53:00 PM, Set Date and Time button), 'Installation Height (cm)' (225, Set button), 'Light intensity' (slider), 'In/Out direction' (radio buttons for In↓ Out↑ and In↑ Out↓), 'Door width' (slider to 120 cm), 'Door threshold' (slider and View Threshold checkbox), 'Data record' (Save records button), and a bottom section with Scene background, Reset Counters, Restore Factory Settings, and System Update buttons.
- I/O Settings Tab:** Includes 'Optocoupled I/O functions' (GPI1, GPI2 dropdowns, Set button), 'Optocoupled I/O test' (GPI1 Test, GPI2 Test, GP01 Test, GP02 Test buttons and open time fields), and 'RS485 Setup' (ID, Baud Rate, Data Bits, Parity, Stop Bits dropdowns, Set button).

Connection, Controls and I/O Settings tabs

The image displays two side-by-side screenshots of the WinClient software interface, each showing a different tab: Wide-Gate and Advanced.

- Wide-Gate Tab:** Features 'Enable/Disable Wide-Gate' (Number of systems: 2, Enable Wide-Gate button, System 0 of 0), and 'Distance between systems (cm)' (60, Set button).
- Advanced Tab:** Contains 'No Tracking Zone' (Start/End X and Y coordinates, Up/Down Line fields, Set button), 'PCN-1001 System Diagnostic' (System Diagnostic checkbox, Get Status button), 'Use Move Detection' (Move Detection checkbox), and 'Out-of-Range Manager' (Out-of-Range Enable checkbox, Check BG button).

Wide-Gate and Advanced tabs

## The “Connection” tab

The “Connection” tab allows you to network the PCN-1001. Refer to [“Use WinClient to network PCN-1001 & Host PC”](#) on page 32 for further information.

Pressing the “Reboot PCN” button you can perform a hardware reboot of the PCN-1001.

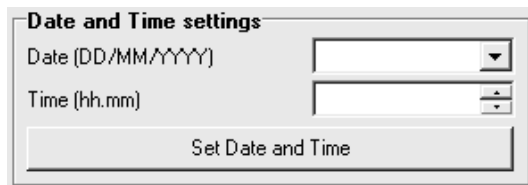


## The “Controls” tab

The “Controls” tab allows you to change the main settings of the PCN-1001 in order to obtain a good resolution on windows 1, 2 & 3.

Any modifications to the settings will be automatically saved to the internal flash memory of the PCN-1001 and takes immediately effect (a reset is not needed).

### Set the “Date and Time settings”

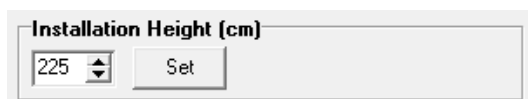


Displays and allows you to set the system time and date.

#### Set date and time correctly!

This is extremely important especially in stand-alone installations where the user periodically downloads data via the USB using the “Save Records” feature.

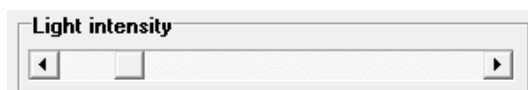
### Set the “Installation Height”



Allows you to set the PCN-1001 installation height.

When the installation height is lower than 225 cm, it is recommended to use the “Out-of-Range Manager” function. This can be done in the “Advanced” tab (see [“Out-of-Range Manager” panel](#) on page 71 for further information).

### Set the “Light intensity”



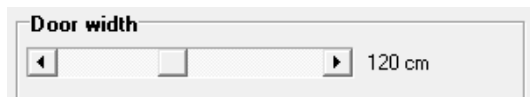
Allows you to control the light intensity of the infrared illuminators and deal with low lighting environmental conditions.

Suggested setting: 70%. This guarantees a good balance between illumination and power consumption.

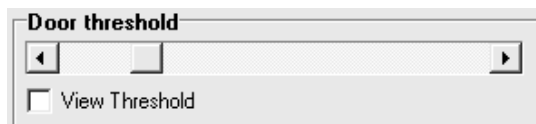
**Set the “In/Out direction”**

Set the direction for incoming and outgoing people correctly. Verify that when a person enters/exits the door, the correct counter is updated.

Changing the direction will reset the in/out counters.

**Set the “Door width”**

Set the value according to the width of the door to monitor.

**Set the “Door threshold”**

**Together with “Scene background”, “Door threshold” is one of the two most important parameters that have to be set properly to increase accuracy.**

During the tracking process, the two counters are incremented only if a person enters the detection area, crosses the door threshold and then exits from the detection area on the opposite side.

By default, the threshold is placed at row 60 (the image height is 120 rows). The position of the threshold line can be set between row 30 and row 89.

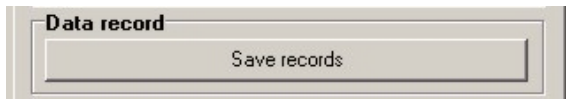
In each visualization mode, except for “Tracking”, flagging the “View Threshold” checkbox will display the current threshold (a white horizontal line) in Windows 1 and 2.

**Guidelines to find the best threshold position:**

- Place it in a way that any person entering or exiting have to cross it.
- Place it away from high reflective surfaces (i.e. the steps on a bus/train). If the detection area includes also a portion outside the transportation vehicle, the door threshold should not be set outside.
- Place it away from door-opening mechanisms
- It should be placed in the middle of the detection area, which if the PCN-1001 has been installed correctly above the door, should correspond to a central position of the “Door threshold” slide bar

If a door is intended to be used in a single direction, for example “in only” or “out only”, it may be useful to move the threshold towards the exit edge of the detection area.

## Save the “Data records”



The Incoming & Outgoing counters, along with Time & Date information, is saved immediately by the PCN-1001; every sixty seconds these values are appended to a text log file within the flash memory of PCN-1001. Depending on the Optocoupled I/O functions selected (see the ‘[Optocoupled I/O functions panel](#)’ paragraph on page 59) the information written to the log file will be different.

The following paragraphs describe the available log file formats.

### The log file

The log file is a series of text lines. There are four different types of line:

**Boot:** The following line is added each time the PCN-1001 completes a boot cycle:

|      |                   |                   |                         |                          |
|------|-------------------|-------------------|-------------------------|--------------------------|
| Boot | date <sup>2</sup> | time <sup>3</sup> | Counter In <sup>4</sup> | Counter Out <sup>5</sup> |
|------|-------------------|-------------------|-------------------------|--------------------------|

**Count:** The following line is added each time the counter registers a person as entering or leaving

|       |      |      |            |             |
|-------|------|------|------------|-------------|
| Count | date | time | Counter In | Counter Out |
|-------|------|------|------------|-------------|

**Start:** The following line is added when the Digital I/O has been enabled or the RS485 command “enable\_pc 1” is used

|       |      |      |            |             |
|-------|------|------|------------|-------------|
| Start | date | time | Counter In | Counter Out |
|-------|------|------|------------|-------------|

**Stop:** The following line is added when the Digital I/O has been disabled or the RS485 command “enable\_pc 0” is used

|      |      |      |                        |                         |
|------|------|------|------------------------|-------------------------|
| Stop | date | time | Result In <sup>6</sup> | Result Out <sup>7</sup> |
|------|------|------|------------------------|-------------------------|

<sup>2</sup> The date in dd/mm/yyyy format

<sup>3</sup> The time in hh/mm/ss

<sup>4</sup> Quantity of incoming people

<sup>5</sup> Quantity of outgoing people

<sup>6</sup> Quantity of people added to the Counter In since the last Start command

<sup>7</sup> Quantity of people added to the Counter Status Out since the last Start command

All the values in a text line are separated by a tab. This makes easy to export data into any spread-sheet application (e.g.: Microsoft Excel, OpenOffice, etc.).

### Example

The following is an example of log file from a bus with a single door:

| Action | Date       | Time     | Counter In | Counter Out |
|--------|------------|----------|------------|-------------|
| Boot   | 26/09/2011 | 08:51:10 | 000000     | 000000      |
| Start  | 26/09/2011 | 08:51:20 | 000000     | 000000      |
| Count  | 26/09/2011 | 08:56:37 | 000001     | 000000      |
| Count  | 26/09/2011 | 08:57:08 | 000002     | 000000      |
| Count  | 26/09/2011 | 08:59:00 | 000002     | 000001      |
| Count  | 26/09/2011 | 08:59:10 | 000002     | 000002      |
| Stop   | 26/09/2011 | 08:59:20 | 000002     | 000002      |
| Boot   | 26/09/2011 | 09:10:00 | 000002     | 000002      |

In this example:

At 08:51:10 the PCN-1001 was powered on, the current counter values were:  
0 In, and 0 Out

At 08:51:20 the door was opened

At 08:56:37 1 person entered

At 08:57:08 1 person entered

At 08:59:00 1 person exited

At 08:59:10 1 person exited

At 08:59:20 the door was closed, the values showed that 2 people had entered and 2 people had exited

At 09:10:00 the PCN-1001 was powered on (for example a reboot occurred)

### Save the records of the log file

By clicking the "Save records" button you will be able to download the log file as text. You will be given the option to "Save As" – "*filename.txt*".



#### NOTE:

The PCN-1001 can record a maximum of 300,000 log lines.

When the PCN-1001 exceed the amount of 299,999 log lines the internal software will overwrite the oldest block of 30,000 lines with the new data, leaving the remaining 30,000 x 9 lines already recorded.

In this case the system will continue to cancel and rewrite each successive block of 30,000 lines

It is possible to use the Mini USB 1.1 client connector located on the front side of the PCN-1001 in order to transfer data (i.e. to a Host PC).

## Acquire the “Scene background”

Scene background

Together with “Door threshold”, “Scene background” is the most important parameter that has to be properly set to obtain a reliable counting process.

The acquisition and storage of the background is a fundamental and sensitive issue.

A bad background acquisition can affect seriously the counting process.

You can understand if the acquired background is affecting the counting process, or if it is necessary to acquire a new background, using the [Subtract the background](#) function (see page 50 for further information).



### IMPORTANT NOTE:

Acquire the background in the following circumstances:

- Once the PCN-1001 has been installed
- When the PCN-1001 has been relocated
- If the background has altered

### Pay attention to the following issues

- Acquire the background with no foreign removable objects in the detection area
  - Acquire the background with doors open, especially if the doors would block the PCN-1001s' field of view as frequently occurs within buses or trains
  - Maintain the lighting of the detection area as much diffused as possible. No spot lighting (e.g. solar reflections or strong lighting) should be present in the detection area during background acquisition
  - Highly reflective, geometric structures situated on or near the floor, such as the metallic parts of a door mechanism, which cause extreme patterns of light and darkness when illuminated by strong light (e.g. direct sunlight or directional halogen lighting) could lead to flawed distance measurements. To avoid performance degradation due to these effects the structures and any highly reflective surfaces should be avoided as much as possible in the detection area
  - Metallic or shiny objects (such as handles, bars, glass, etc.) should not cover a significant part of the detection area. If this is not avoidable, the reflectivity of these items should be reduced by means of non-reflective materials or modifying the “No Tracking Zone”
  - Use the features of the “No Tracking Zone” panel (see [The “Advanced” tab](#) on page 68).
- The “No Tracking Zone” feature allows you to define rectangular zones in the detection area where tracking will not be performed. This feature can be used to mask surfaces that are very reflective or with spot lighting

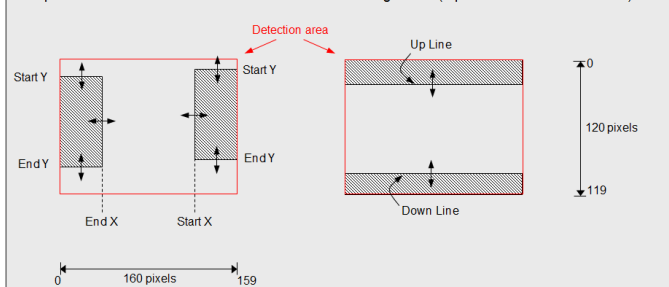
#### RANGES:

End X = pixel 0 to 70  
 Start X = pixel 159 to 91  
 Start Y = pixel 0 to 119  
 End Y = pixel 119 to 0

Up Line = pixel 0 to 59  
 Down Line = pixel 119 to 60

#### Example:

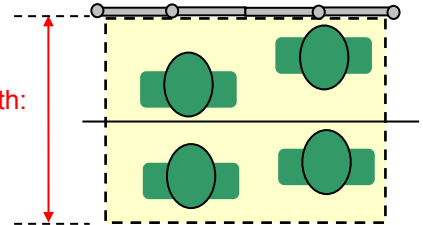
The picture below shows the detection area with no tracking zones (represented as dashed areas):





- Exclude as much as possible the area outside the transportation vehicle
- Verify that all the entrance area is detected properly. Make a person move under the PCN-1001s and verify the correct detection
- The PCN-1001 cannot track more than 10 people at a time. In particularly crowded conditions, i.e. on-board buses, 10 people can be compressed in less than  $1 \text{ m}^2$ , so the detection area should be smaller. In these conditions a depth of 70~90 cm at floor level is fine to guarantee a good tracking of people.

Suggested depth:  
70~90 cm



### Steps to save the background

1. Connect the PCN-1001 by pressing the “Connect” button
2. Select “8bit Disp. + median + FPN + ODC” in the drop-down list. In this way Windows 1 and 2 will display the separated images as seen by the two cameras, subtracting the Fixed Pattern Noise (FPN) and the Optical Distortion Correction (ODC). Window 3 will display the disparity map and a median filter will be applied for reducing noise
3. Press the “►” button.
4. **Ensure the doors of the gate are open**
5. **Check that the PCN-1001 is correctly set up**  
 This means that in windows 1 and 2 you must see the scene as captured by the two cameras while in window 3 the image has to be completely black or dark grey-scaled.  
 If for any reason it does not appear dark or any white spot appears, this will be recognised as one or more objects present in the detection area. A background stored in these conditions may reduce counting accuracy during the tracking process. Refer to the **“Pay attention to the following issues”** paragraph above for possible solutions
6. Press the “■” button
7. Select the “Controls” tab and click the “Scene Background” button. Ensure that window 3 remains completely dark or dark grey-scaled until the process has completed. If not restart from step “5”

Wait for the progress bar to complete. When completed, the “Scene background Saved!” dialog box is being displayed.

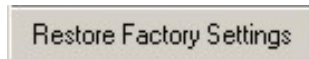


#### NOTE:

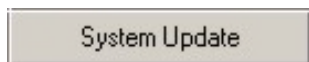
Pay careful attention that the USB cable or any part of your body (e.g.: feet) are not visible in the detection area

***“Reset counters”***

Set to zero the Incoming and Outgoing counters.

***“Restore Factory Settings”***

Resets the system to its original factory configuration.

***Perform a “System update”***

Use this button to upgrade the PCN-1001 software when a new version becomes available.  
Check periodically the Download area on the Eurotech website for the latest updates.

## The “I/O Settings” tab

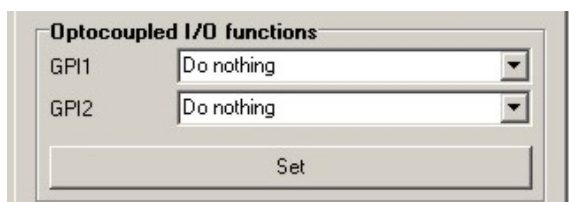
The PCN-1001 can be interfaced and triggered by means of 2 independent optocoupled inputs and 2 independent optocoupled outputs.

The RS485 port is the main communications interface used when the PCN-1001 is installed on-board a transportation vehicle.

Each modification to these settings will be automatically saved in the internal flash memory of the PCN-1001 and takes immediate effect (a reset is not needed).

### The “Optocoupled I/O functions” panel

The two inputs, GPI1 and GPI2 (GPI means General Purpose Input), can be used in 6 different modes. These can be selected using the two drop-down menus.



Press the “Set” button to confirm the drop-down menu selection

|  |   |
|--|---|
| <b>Do nothing:</b>   | The system ignores any signals received on the input lines  |
| <b>Test:</b>   | Allows the operator to test the two input lines (See ‘ <a href="#">Optocoupled I/O test panel</a> ’ on next page for more details).   |
| <b>Reset counters:</b>   | Sets the incoming and outgoing counters to zero when a rising edge is detected. In the Wide-Gate configuration, only the GPI2 can be set as reset. It has to be set connecting the first PCN-1001 and the signal will be available on the last PCN-1001.  |
| <b>Enable/Disable counting</b>   | When the GPI1 / GPI2 inputs receive a rising edge (they are enabled) the PCN-1001 will start the counting process.<br>When the GPI1 / GPI2 inputs receive a falling edge (they are disabled) the PCN-1001 will stop the counting process.<br>In the Wide-Gate configuration only the GPI1 can be set as Enable/Disable. |
| <b>Reset counters reverse:</b>   | Sets the incoming and outgoing counters to zero when a falling edge is detected. In the Wide-Gate configuration, only the GPI2 can be set as reset. It has to be set connecting the first PCN-1001 and the signal will be available on the last PCN-1001  |
| <b>Enable/Disable counting reverse</b>   | When the GPI1 / GPI2 inputs receive a falling edge (they are disabled) the PCN 1001 will start the counting process. When the GPI1 / GPI2 inputs receive a rising edge (they are enabled) the PCN 1001 will stop the counting process.<br>In the Wide-Gate configuration, only the GPI1 can be set as Enable/Disable.   |
| The default mode for the PCN-1001 when powered-up is “Counting Enabled”.<br>The counting will be Disabled / Enabled only when the GPI changes state. |   |

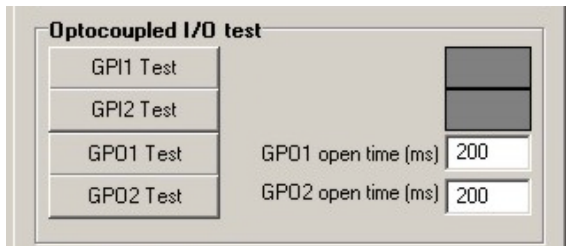
#### Example 1:

- The PCN-1001 is powered up: the counting will be enabled by default
- The GPI is enabled: the counting was already enabled at power up and nothing change
- The GPI is disabled: the counting will be disabled

#### Example 2:

- The PCN-1001 is powered up: the counting will be enabled by default
- The GPI is disabled: the counting will be disabled
- The GPI is enabled: the counting will be enabled

## The “Optocoupled I/O test” panel



The two outputs, GPO1 and GPO2, (GPO means General Purpose Output) have the purpose to react when a person is counted:

- GPO1: By default is associated to incoming people
- GPO2: By default is associated to outgoing people

The optocoupled output electronics behave as low-side switches normally closed.

When the PCN-1001 detects a person, one of the two outputs (depending on the direction of the person) turns its status to open for a period of “GPO-Open-Time” milliseconds.

The GPO-Open-Time (GPOOT) can be configured inserting a value (from 8 to 1020 milliseconds) in the two GPO1 and GPO2 open time fields on the “Optocoupled I/O test” panels.

If two people walk in the same direction under the PCN-1001, the first signal will be immediately sent to the appropriate output, the second will be queued for (2 x GPOOT) milliseconds.

In the Wide-Gate configuration the GPO1 used will be the one of the first PCN-1001.

The GPO2 will be the one of the last PCN-1001. In any case, both the GPO-Open-Times have to be set connecting the first PCN-1001.

### GPI1 Test / GPI2 Test

Follow these steps to test the inputs:

1. In the drop-down lists of the “Optocoupled I/O functions” panel select the option “Test” for either GPI1 or GPI2
2. Press the “Set” button
3. Press either “GPI1 Test” or “GPI2 Test” button. If a rising edge is received on GPI1 or GPI2, the corresponding grey rectangle will turn to white. If a falling edge is received it will turn to grey



**NOTE:**

The “Test” functions are only available via Socket API, not via RS485.

### GPO1 Test / GPO2 Test

In order to test the outputs press the “GPO1 Test” or “GPO2 Test” button. The GPOOT value will be set to the nearest multiple of four lower than or equal to the inserted value.



**NOTE:**

The “Test” functions are only available via Socket API, not via RS485.

## Notes about the Digital I/O interface

The PCN-1001 can be interfaced and triggered by means of two general-purpose inputs and two general-purpose outputs.

For example, the general-purpose digital I/O interface can be used to detect a doors status (open or closed).

The normal logic is:

- 0 Door closed
- 1 Door open

The counters will be activated when the door status becomes 1 (Open).

The reverse logic is:

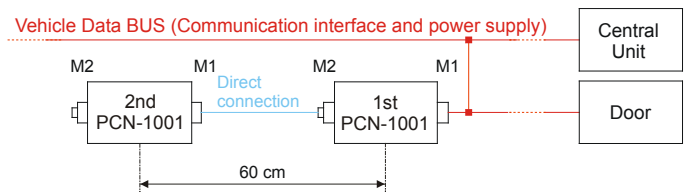
- 1 Door closed
- 0 Door open

The counters will be activated when the door status becomes 0 (Open).

The general-purpose I/Os are 1 kV isolated and are available on the M1 connector.

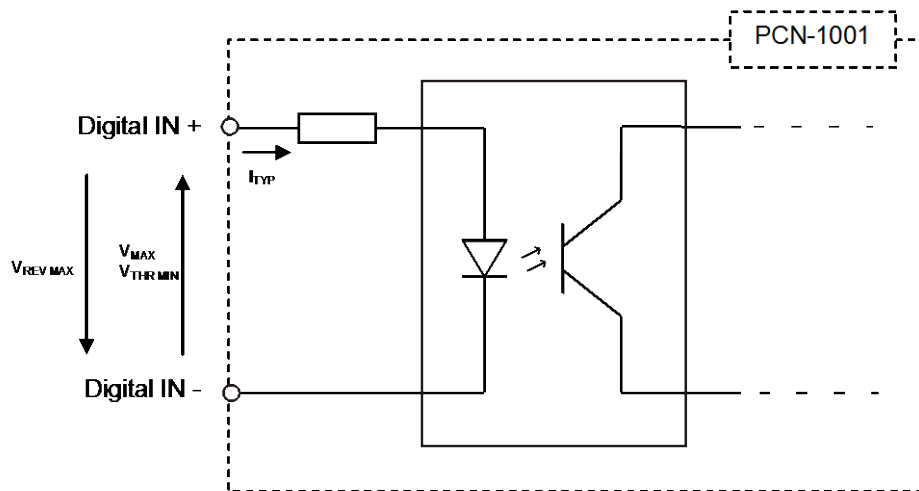
They allow for a direct connection to industrial equipment with an isolation of 3750 V<sub>RMS</sub>.

In the Wide-gate configuration the door status input has to be connected to the M1 connector of the first PCN-1001, using GPI1. For further information refer to the '[Optocoupled I/O functions panel](#)' paragraph on page 59 and to the Note: '[How the threshold works when using digital inputs](#)' on page 39.



## The Input Block

The figure below shows the electrical schematics of the input differential optocoupled block. The “Digital IN” labels on the left side refer to the digital IN signals on the M1 and M2 connectors, while the right side of the figure refer to the internal processing part of the system. This input block can be connected to a standard TTL port. The Input Block draws a constant current when driven above the threshold.



Electrical schematics of the input differential optocoupled block

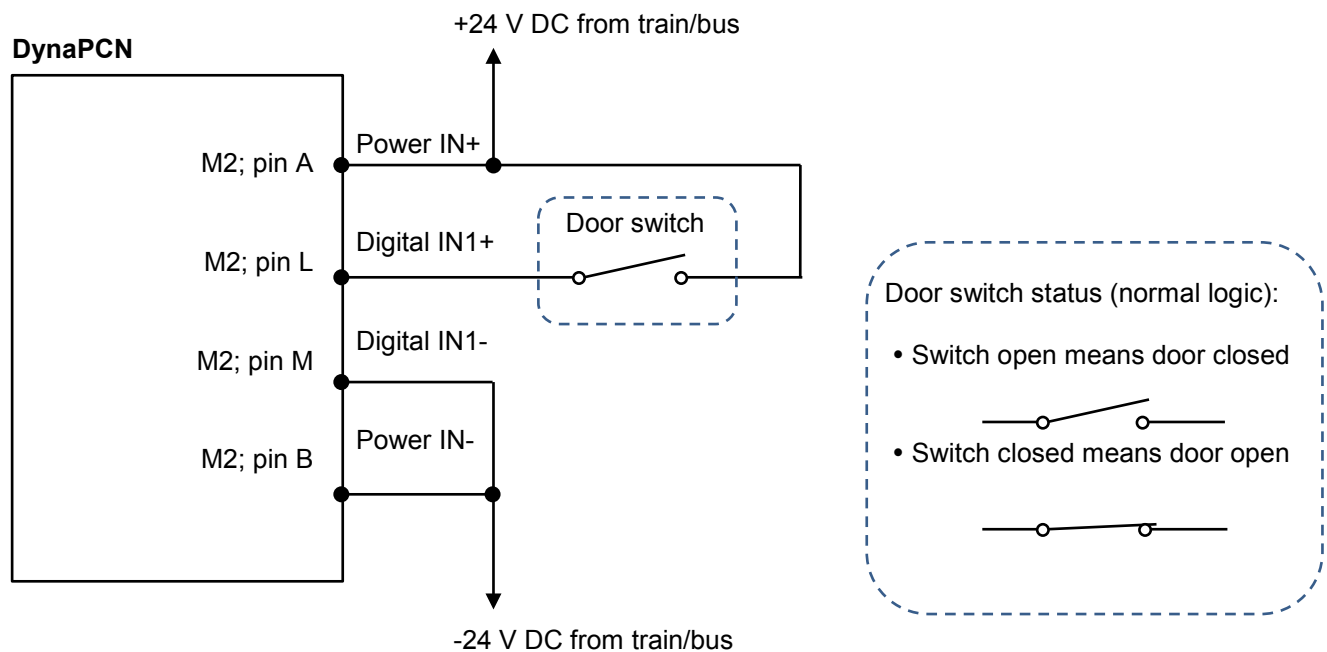
### Recommended input operating conditions:

| PARAMETERS                | SYMBOL         | VALUE | UNIT |
|---------------------------|----------------|-------|------|
| Minimum Threshold Voltage | $V_{THR\ MIN}$ | 2.4   | V    |
| Maximum Voltage           | $V_{MAX}$      | 32    | V    |
| Maximum Reverse Voltage   | $V_{REV\ MAX}$ | 32    | V    |
| Typical Current           | $I_{TYP}$      | 3.6   | mA   |

**Example: how to simulate a digital input using the normal logic**

Make the connections displayed in the following figure.

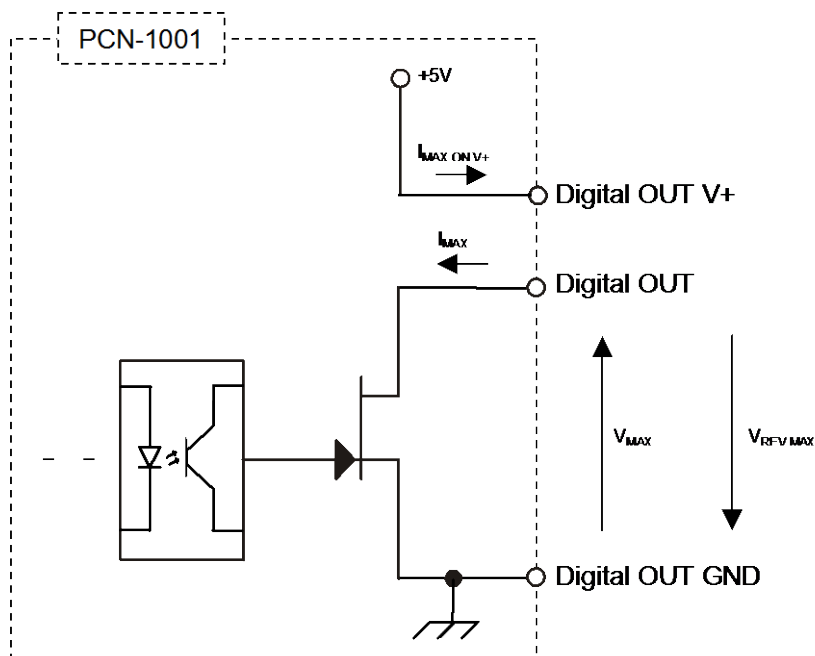
The Door switch simulates the digital input.



## The Output Block

The figure below shows the electrical schematics of the output block. The labels on the right side refer to the M1 and M2 connectors, while the left side of the picture refers to the internal processing part of the system.

The Output Block behaves as a low-side switch. The load connected to the low-side switch can draw current either from an external power source or from the Digital OUT V+ referred to the Digital OUT GND.



Schematics of the output differential optocoupled block

## Recommended output operating conditions

| PARAMETERS                        | SYMBOL          | VALUE | UNIT |
|-----------------------------------|-----------------|-------|------|
| Maximum Voltage                   | $V_{MAX}$       | 32    | V    |
| Maximum Reverse Voltage           | $V_{REV MAX}$   | 32    | V    |
| Maximum Current                   | $I_{MAX}$       | 300   | mA   |
| Maximum Current on Digital OUT V+ | $I_{MAX ON V+}$ | 20    | mA   |



***The “RS485 Setup” panel***

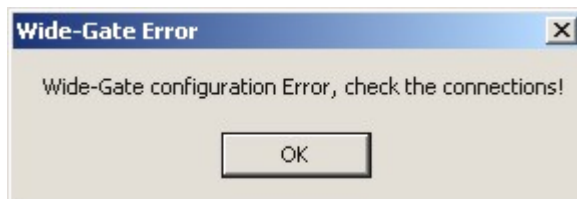
See ‘[Configure the RS485 port of the PCN-1001](#)’ paragraph on page 75 for further information.

## The “Wide-Gate” tab

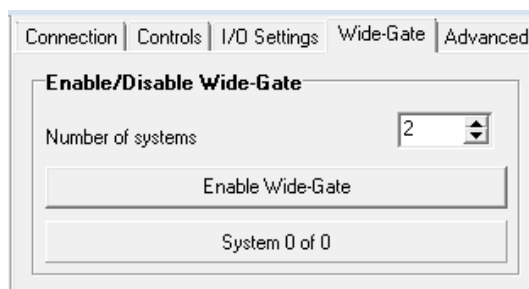
When you need to monitor gates wider than 200 cm the “Wide-Gate” is an algorithm that has been developed in order to properly configure the necessary PCN-1001 devices.

### Setting up the PCN-1001 devices for the Wide-Gate configuration

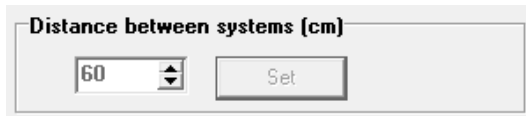
1. Connect properly all the PCN-1001 devices.
2. Connect your Host PC via the USB port (located under the service plate) to the Master PCN-1001 (the one directly connected to the Control Unit)
  - a. Launch the WinClient utility and Click “Scan”
  - b. Select the IP address of the PCN-1001. Click “Connect”
  - c. Select the “Controls” Tab. Click “Restore Factory Settings”
  - d. Click “Yes” when the “Warning” message will appear.  
If you do not perform a restore before configuring the “Wide-gate” mode you may receive the following error:



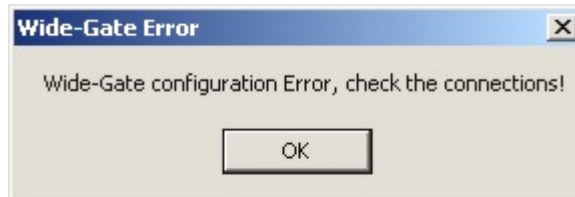
- e. Select the “Connection” Tab and click “Disconnect”
3. Connect your Host PC via the USB port to the 1<sup>st</sup> Slave PCN-1001
  - a. Click “Scan”
  - b. Select the IP address of the PCN-1001 and click “Connect”
  - c. Select the “Controls” Tab
  - d. Click “Restore Factory Settings”
  - e. Click “Yes” when the “Warning” message will appear
  - f. Select the “Connection” Tab and click “Disconnect”
4. Move to next Slave PCN-1001 and repeat the above step 3 for all Slaves
5. Connect your Host PC via the USB port to the Master PCN-1001
  - a. Click “Scan”
  - b. Select the IP address of the PCN-1001 and click “Connect”
  - c. Select the “Wide-Gate” Tab
  - d. Insert the quantity of counters connected (i.e.: 2)



- e. Set the distance (in cm) between the counters



- f. Click "Enable Wide-Gate":
- If problems occur you will obtain a Wide-Gate Error. Check for the cable connections (you may have selected a higher system number than actually connected/available)



- If all is ok a confirmation message will appear. Click "OK"
- g. Select the "Controls" Tab
- h. Click "Scene Background"
- i. Click "OK" when a confirmation message will appear
- j. Select the "Connection" Tab and click "Disconnect"
6. Cycle the power on all the PCN-1001 devices
7. Wait for the PCN-1001 devices to boot
8. The PCN-1001-00 is now ready for normal "Wide-Gate" counting operations

**Note:**

Remember to set the configuration parameters (direction, door threshold, light intensity, etc.). The configuration parameters have to be set only after the Wide-Gate mode has been enabled and you are connected to the Master PCN-1001. This will redirect the configuration parameters to the slave counters.

## The “Advanced” tab

### “No Tracking Zone” panel

NOTE: The no tracking zone feature is NOT available in Wide-Gate mode

The “No Tracking Zone” feature allows you to define rectangular zones in the detection area where tracking will not be performed. This feature can be used to mask surfaces that are very reflective or with spot lighting.

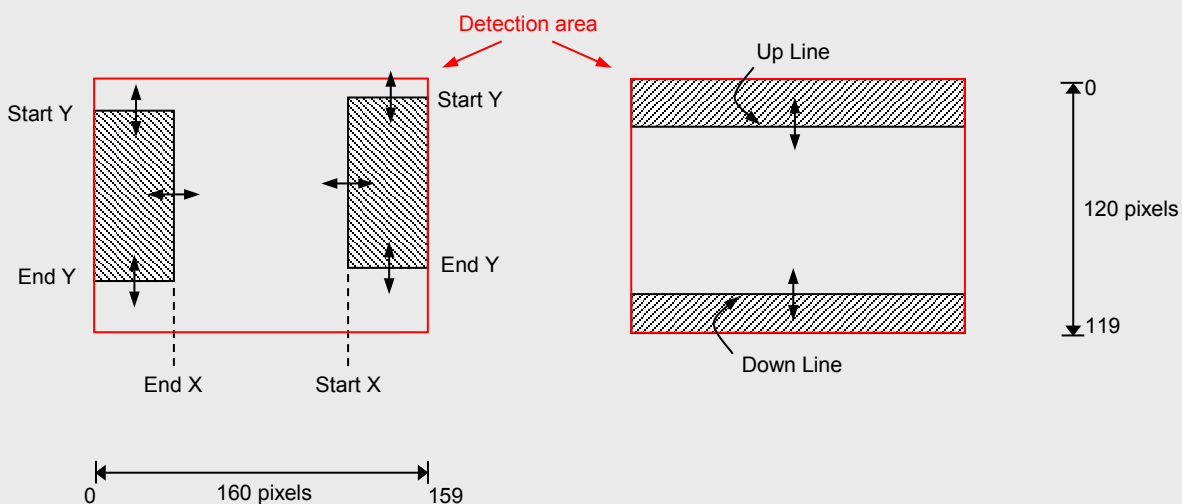
#### RANGES:

End X = pixel 0 to 70  
 Start X = pixel 159 to 91  
 Start Y = pixel 0 to 119  
 End Y = pixel 119 to 0

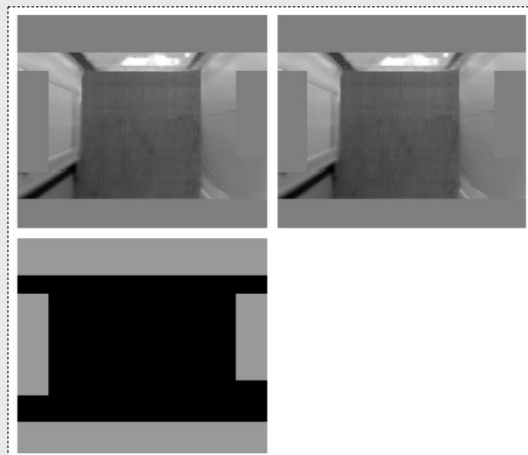
Up Line = pixel 0 to 59  
 Down Line = pixel 119 to 60

#### Example:

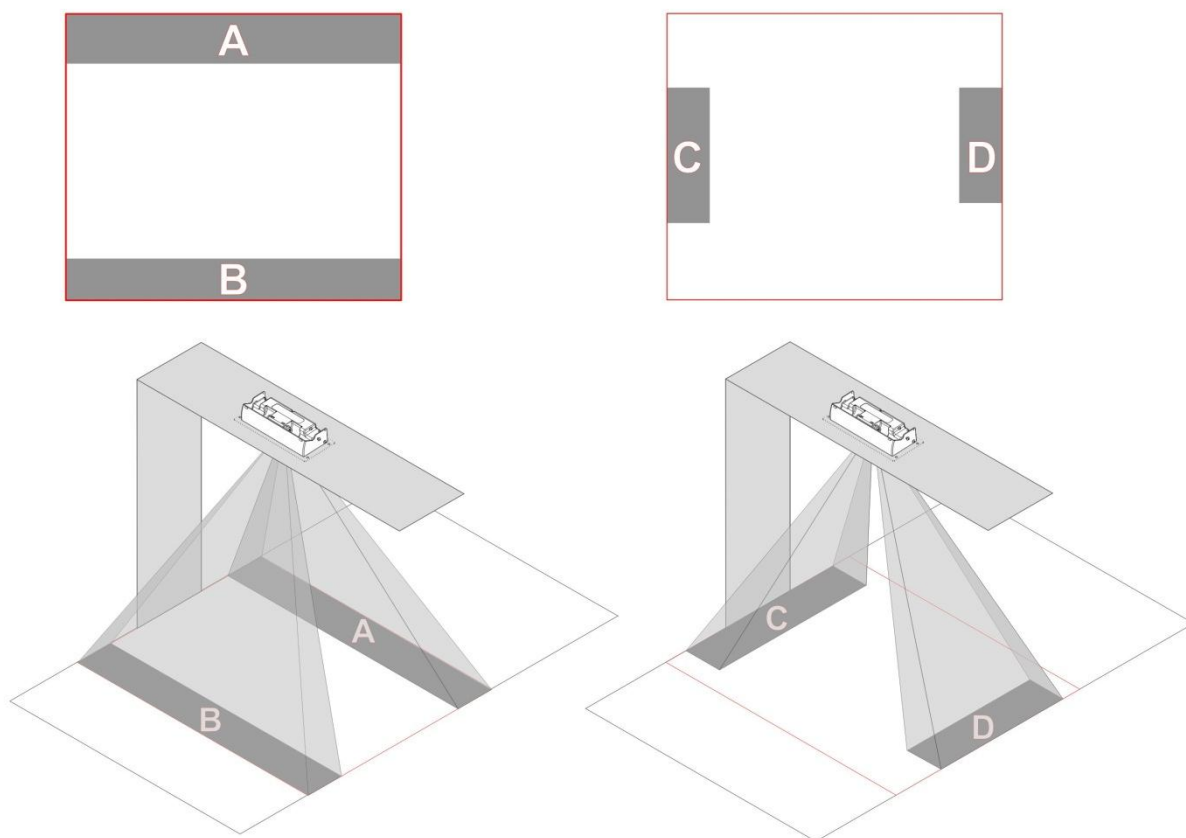
The picture below shows the Detection area with the no tracking zones represented as dashed areas:



The picture below shows how the Detection area will appear in the WinClient windows. The no tracking zones are represented as dark grey rectangles:

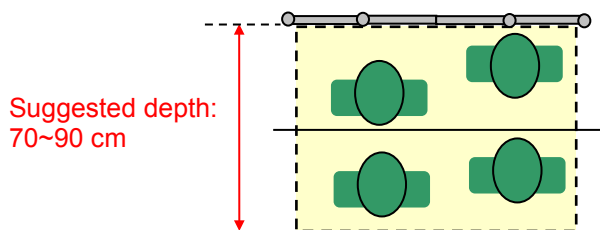


The picture below shows how the no tracking zones will affect the cameras' field of view and the Detection area.



**Pay attention to the following issues:**

- Exclude as much as possible the area outside the transportation vehicle
- Verify that all the entrance area is detected properly. Make a person move under the PCN-1001s and verify the correct detection
- The PCN-1001 can't track more than 10 people at a time. In particularly crowded conditions, i.e. on-board buses, 10 people can be compressed in less than 1 m<sup>2</sup>, so the detection area should be smaller. In these conditions a depth of 70~90 cm at floor level is fine to guarantee a good tracking of people.



## “PCN-1001 System diagnostic” panel


**Note:**

With the WinClient software revision 2.2 the “PCN-1001 System diagnostic” works only if the PCN-1001 is set in single configuration.

This is a diagnostic algorithm that detects and signals any problem that may occur to the optical section of the PCN-1001 (i.e.: blind cameras, cameras malfunction, luminosity too low, etc.).

Pressing the “Get Status” button will change the colour of the grey circle:

- If the circle is red the diagnose is negative (there is a problem)
- If the circle is green the diagnose is positive (no problems occurred)

Every time the diagnostic status changes, it will be written on the log file

The following commands can be used to manage the system diagnostic:

| COMMAND                                | DESCRIPTION  |
|--|--|
| <b>diagnostic_en 1 (unsigned char)</b> | Diagnostic enabled (default configuration)   |
| <b>diagnostic_en 0</b>                 | Diagnostic disabled  |
| <b>pcn1001_status</b>                  | Returns the diagnostic status displaying two values (unsigned char)<br>The first value will indicate the diagnose status: <ul style="list-style-type: none"> <li>• If it is 1 the diagnose is positive (no problems occurred)</li> <li>• If it is 0 the diagnose is negative (there is a problem)</li> </ul> The second value indicates the error code (it is 0 if the diagnostic is positive) |

## “Use Move detection” panel



“Use Move detection” is an algorithm that when enabled enhances the detection sensitivity.


**Note:**

Keep this feature enabled.

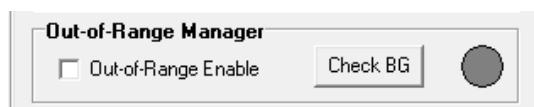
The colour of the grey circle will change in the following way:

- The circle should appear green when somebody is crossing the detection area
- The circle should appear red in other cases.

The following commands can be used to manage the Move Detection:

| COMMAND                              | DESCRIPTION  |
|--------------------------------------|--|
| <b>move_det_en 1 (unsigned char)</b> | Move detection enabled   |
| <b>move_det_en 0 (unsigned char)</b> | Move detection disabled  |
| <b>move_det_val</b>                  | Returns the current value of the "Move detection" parameter.<br>Two values (int) will be returned, one for the right sensor and one for the left sensor.<br>The final value should be the average between the right and left sensors                       |
| <b>move_det_thr</b>                  | Used to set the threshold value. Use the "Move_det_thr" followed by the value of the new threshold (int)   |
| <b>move_det_status</b>               | Returns the current move detection status displaying a value (unsigned char) that can be:<br>0 if the counting is disabled<br>1 if the counting is enabled because the "move detection" algorithm is disabled or because there is a cross through the gate |

### ***"Out-of-Range Manager" panel***



"Out-of-Range Manager" is an algorithm that, when enabled, reduces the noise caused when a tall person is passing (18-20 cm from the sensor).



**Note:**  
Keep this feature enabled.

The colour of the grey circle will change in the following way:

- The circle should appear red when there is noise
- The circle should appear green in other cases.

# Test an RS485 connection and use the *RS485\_GUI*

## Introduction

The PCN-1001 allows you to create an RS485 network, with the possibility of connecting multiple devices – up to 32 at the same time – and perform communications over long distances even in electrically noisy environments.

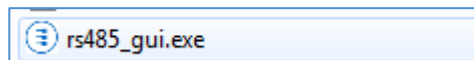
RS485 communications are based on a master/slave configuration:

The master (a Host PC such as a laptop or, in a real situation, the main on-board computer that acts as the Control Unit, for example a Eurotech DuraCOR system) begins communications by sending a message to the slave devices

The slave devices (the PCN-1001 devices) analyse the message, execute a command (if required) and transmit the answer to the master.

“**RS485\_GUI**” is a stand-alone program that can be used to simulate real working conditions where the Host PC or the Control Unit (the main on-board computer, for example a Eurotech DuraCOR system) sends/receives commands via an RS485 connection to/from one or more PCN-1001.

Double-click on the *rs485\_gui.exe* icon to run the program



**Warning:**

The parameters of the serial port on the Host PC and PCN-1001 must be equal (see '[Configuring the RS485 port of the PCN-1001](#)' on page 71 )



**Warning:**

The PCN-1001 system does not include any line termination resistor, nor any fail safe bias resistors. The two ends of the RS485 bus should include a termination resistor connected across the Data + and Data – wires. Furthermore, one end of the RS485 bus should include pull-up or pull-down resistors to ensure a fail-safe bias for each data line/wire when the lines are not being driven by any device.

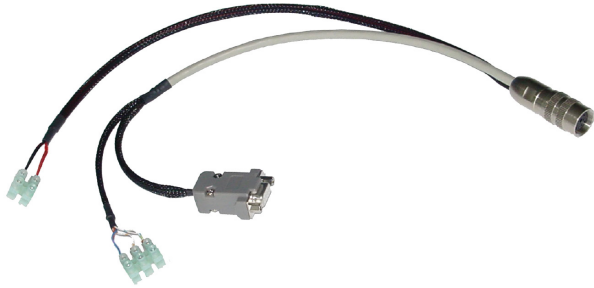


## Notes about the RS485 serial bus for development purposes

The E14-35-12-00 (Multifunction cable 1) contained in the DYPCN-10-01-00-DK0 Development kit you are using to supply power to the PCN-1001, also allows you to connect the PCN-1001 to the RS485 port of the Host PC by using the DB9 connector.

Personal Computers generally do not have a RS485 port. You can use the “USB – RS485 cable” (an element of the Development kit) to connect the Multifunction cable 1 with the USB port of the Host PC. The “USB – RS485 cable” also integrates one termination resistors (120 Ohm) and two fail safe resistors (560 Ohm).

Refer to document: “DynaPCN Connection Diagrams” before using the USB – RS485 cable.



The “Multifunction cable 1”



The “USB – RS485 cable”

## Example of RS485 network

Several PCN-1001 devices can be connected in a Multi-drop RS485 two-wire half-duplex setup, see the diagram below. In this configuration:

You need a Host PC that acts as Master device, manages the RS485 network, and has ID number = 1

Each one of the PCN-1001 devices must have same values for Baud Rate, Data Bits, Parity and Stop Bits, but different ID number, starting from 2.

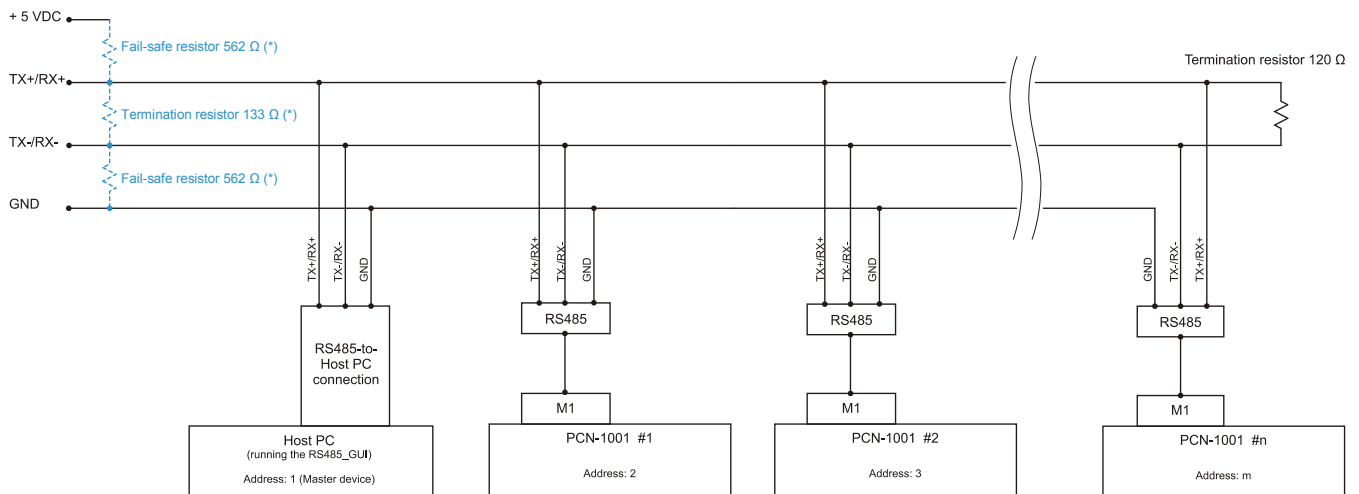
The Host PC starts the communication and includes the address of the target PCN-1001 within the SNP (Small Network Protocol, see the paragraph 'The communication protocol' on page 80).

All the PCN-1001 devices receive the command but only the target PCN-1001 will respond.



### Note:

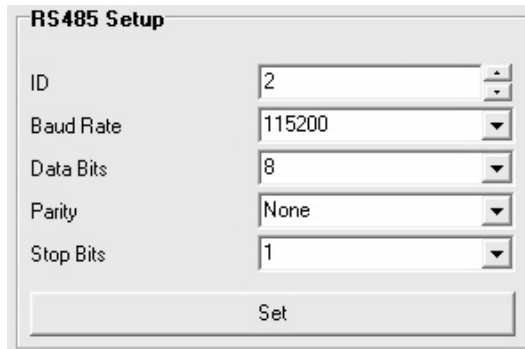
In Wide-Gate Configuration the Host PC sees only the first PCN-1001 of each group of counters in and the address has to be assigned only to this one.



(\*) These resistors are required within the RS485 line if not already present in the RS485-to-Host PC connection

## Configure the RS485 port of the PCN-1001

Use *WinClient* to configure the RS485 ports of the PCN-1001. Select the “I/O Settings” tab and refer to the “RS485 Setup” panel as shown below:



The image shows a dialog box titled "RS485 Setup". It contains five configuration fields, each with a label and a value field followed by a small arrow icon indicating it's a dropdown or spinner. The fields are: ID (value 2), Baud Rate (value 115200), Data Bits (value 8), Parity (value None), and Stop Bits (value 1). At the bottom of the dialog is a button labeled "Set".

| Parameter | Value  |
|-----------|--------|
| ID        | 2      |
| Baud Rate | 115200 |
| Data Bits | 8      |
| Parity    | None   |
| Stop Bits | 1      |

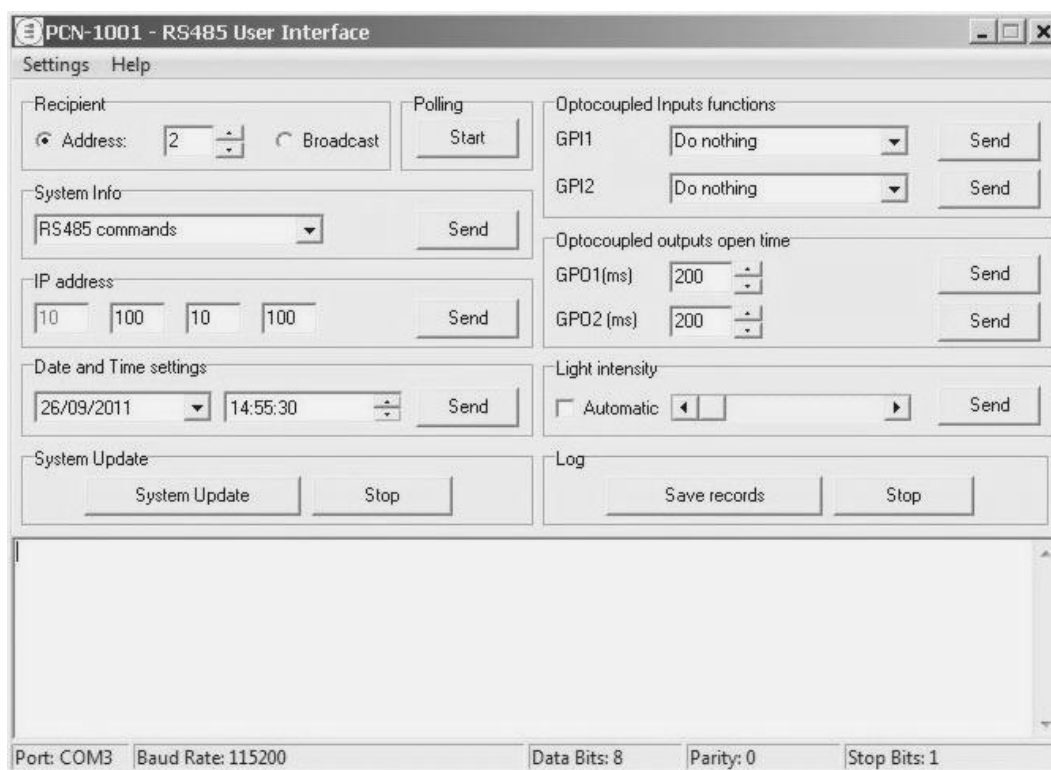
Set

Insert there the parameters of the PCN-1001 serial port and then click “Set” to save them.

Each modification to these settings will be automatically saved in the internal flash memory of the PCN-1001 and takes immediate effect (a reset is not needed).

## Start the **RS485\_GUI**. Configure the RS485 port of the Host PC

Double click on the **RS485\_GUI** link on the Host PC desktop. The following interface will appear:



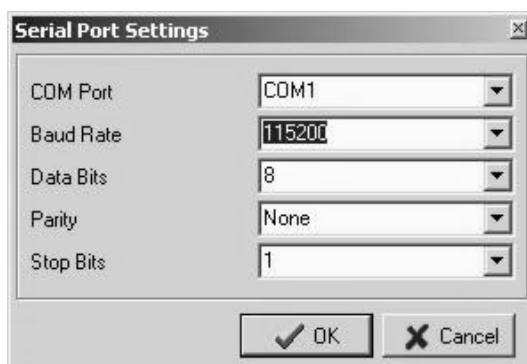
It allows you to test all the commands available to the RS485 port.

Before starting communications, it is important to verify that the RS485 port configuration is correct.

These values are shown in the status bar of the GUI.

They can be modified selecting in the main menu: **Settings > COM Settings**.

The screenshot like the following will appear:



### Warning:

It is important that the Baud Rate, Data Bits, Parity and Stop Bits values have to be the same for the master and for the slaves connected.

## “Recipient” and “Polling” panels



The first operation to do is polling; this will verify the connection status of the intended target PCN-1001.

To do this, Insert the appropriate address in the Recipient box and then click the Start button.

If the appropriate PCN-1001 is found, the address is correct and the port is configured correctly, the software will display a message like: “Got reply from [Slave #2]”.

Otherwise the following message will be displayed: “Timeout expired!!!” In this case, you must verify the settings and try again.

For each command that has been sent to a PCN-1001, the *RS485\_GUI* waits for an answer.

Three kinds of answer are available:

| RESPONSE                      | DESCRIPTION  |
|-------------------------------|--|
| <b>[Slave #2] sled</b>        | The PCN-1001 has received the “sled” command followed by the LED level (see “RS485 Protocol”) and replied with the string: “sled”. |
| <b>Got corrupted reply!!!</b> | The <i>RS485_GUI</i> could not understand the answer.  |
| <b>Timeout expired!!!</b>     | The signal has been lost and the <i>RS485_GUI</i> did not receive any answer.  |

Flag “Broadcast” for sending a message to all the PCN-1001 devices connected (i.e.: for setting the same time and date to all the PCN-1001)

When a message is sent in broadcast mode, the PCN-1001 devices will not reply.

## “System Info” panel

The “System Info” combo box shows the software versions installed on the PCN-1001.



It also allows you to read and modify the counters status and disable the counter algorithm. Select the value and press “Send”.

| VALUE                               | DESCRIPTION   |
|-------------------------------------|---|
| <b>Kernel version</b>               | PCN-1001 Linux kernel version.  |
| <b>System version</b>               | PCN-1001 operating system version.  |
| <b>Firmware version</b>             | PCN-1001 FPGA firmware version.   |
| <b>Imgserver version</b>            | The <i>Imgserver</i> program version.   |
| <b>Enable person counting</b>       | Enables the person counting process.  |
| <b>Disable person counting</b>      | Disables the person counting process.   |
| <b>Get counters</b>                 | Requests the Incoming and Outgoing counter values.  |
| <b>Reset counters</b>               | Resets the Incoming and Outgoing counters.  |
| <b>Get Date Time</b>                | Resets the Date and the Time  |
| <b>Enable Diagnostic Control</b>    | Enables the Diagnostic Control  |
| <b>Disable Diagnostic Control</b>   | Disables the Diagnostic Control   |
| <b>Get Diagnostic status</b>        | Returns the diagnostic status displaying:<br>1 if the diagnose is positive (no problems occurred)<br>0 if the diagnose is negative (there is a problem) |
| <b>Test Digital Input 0 &amp; 1</b> | Allows displaying in the log view a message about the state of the digital input 0 or 1.  |

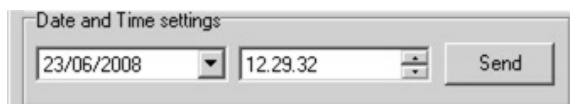
## “IP Address” panel



This allows you to insert the PCN-1001 IP address.

**The default IP address is 10.100.10.100**; the first octet is fixed to avoid network configuration mismatch. In Wide-Gate configuration all the PCN-1001 of same group will obtain the same IP address

## “Date and Time settings” panel



This allows you to set the Time and Date on your PCN-1001.

## “System Update” panel



The “System Update” button, like the equivalent button in “WinClient”, allows you to choose an *Imgserver* to be sent to the PCN-1001 via RS485.

The file transfer progressing is displayed in the log view as shown as follows:



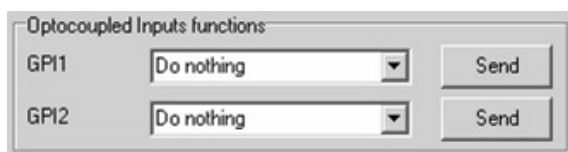
No other operation is allowed during file transfer.

When transfer finishes a proper message will be shown in the log view and the user will be allowed to perform other operations.

The “Stop” button stops the transfer and interrupts the update.

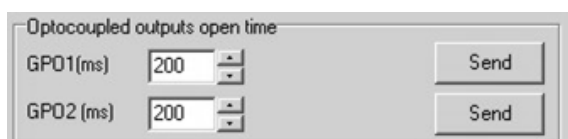
Notice that even if during the file transfer some packets are lost the protocol guarantees a successful transmission by sending again the lost packets. If more than 10 consecutive packets are lost the application will stop the file transfer and an error message will be displayed in the log view.

### ***“Optocoupled inputs functions” panel***



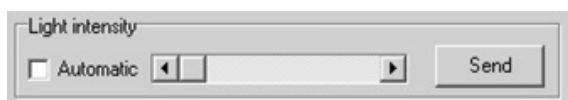
See the section ‘[The I/O settings tab – Optocoupled I/O](#)’ on page 59.

### ***“Optocoupled outputs open time” panel***



See the section ‘[The I/O settings tab – Optocoupled I/O](#)’ on page 59.

### ***“Light intensity” panel***



This allows you to set the LED light intensity.

## “Log” panel



The “Save records” button allows you to download the log file as a text. This option works as ‘[Save the records of the log file](#)’ on page 55.

The “Stop” button allows you to stop and cancel the saving process.

## The communication protocol

SNP (Small Network Protocol) is the communication protocol used in the RS485 connection.

The packet format contains the addresses of both the sender and recipient and the number of packets to be sent along with the current packet number.

Bit stuffing is not used because, when the length of data field is stated, all values can be sent in the data field. The maximum length of the data field is MAX\_DATA\_LENGTH = 1024 bytes.

| FIELD                    | LENGTH (BYTES)       | CONTENTS  |
|--------------------------|----------------------|---|
| <b>PreAmble</b>          | 5                    | 5 times 0xFF, to be sent prior to the initial character in order to give time for change of transmission direction                            |
| <b>StartCharacter</b>    | 1                    | SOH = 0x01  |
| <b>Source</b>            | 1                    | Address of sender   |
| <b>Destination</b>       | 1                    | Address of recipient  |
| <b>TotalPacketNumber</b> | 1                    | Total number of packets   |
| <b>PacketNumber</b>      | 1                    | Number of this packet<br>First packet has number 1  |
| <b>DataLength</b>        | 2                    | States the length of the data field<br>LSB (Least Significant Byte) is to be sent first   |
| <b>Data</b>              | 0 to MAX_DATA_LENGTH | Each byte can contain 0 to 0xFF   |
| <b>CRC16</b>             | 2                    | CRC16 (x16 x15 x2 x0) check sum calculated from Source to Data (both fields included) with an initial value of -1.<br>LSB is to be sent first |
| <b>Postamble</b>         | 1                    | 0xFF.   |

Remember that there is only one master on the bus, while all others are slaves. When the master has sent a message to a slave, an answer from the slave is expected. A slave cannot send anything to a master without being asked. It is possible to send to all slaves at a time (broadcast), which means that slaves do not return an answer and that messages are not retransmitted.



## Polling

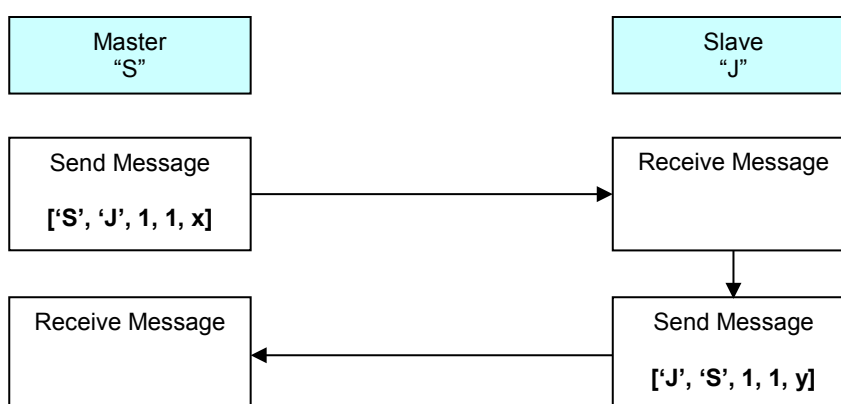
The master can poll a slave who answers with a message to the master. A poll is defined as a packet with:

TotalPacketNumber = 0  
 PacketNumber = 0  
 DataLength = 0

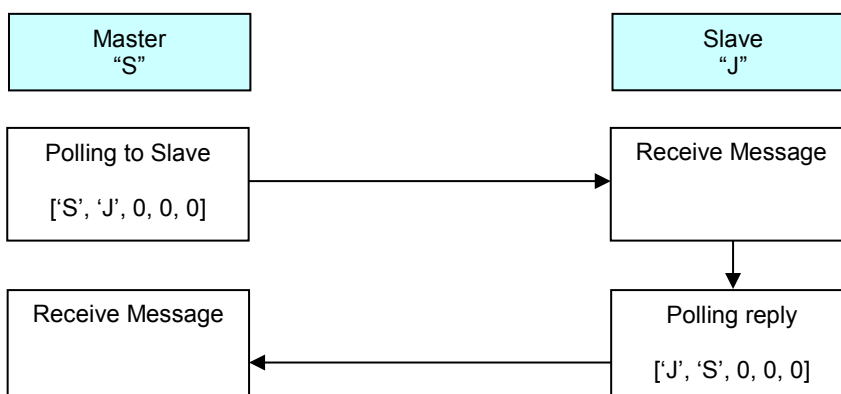
## Scenarios

The following charts are intended to give an idea of how the sequences are sent/received by the master and slave devices:

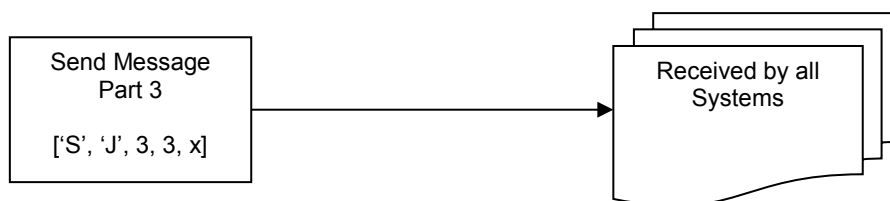
### Short Message to Slave



### Polling



## Broadcast Message



Each message between Master and Slave is made in the following format:

| Source | Destination | TotalPacketNumber | PacketNumber | DataLength |
|--------|-------------|-------------------|--------------|------------|
|--------|-------------|-------------------|--------------|------------|

Source: Address of the device transmitting the message  
 Destination: Address of the target device  
 TotalPacketNumber: Quantity of Packets to be sent  
 PacketNumber: The number of the current packet being sent  
 DataLength: Length of the data in this Packet [0x01 to 0xFE or MAX]

Therefore, as we can see from the examples on the previous pages, a message may take this form:  
 [0x01, 0x02, 3, 2, MAX]

In this case Node "0x01" is sending a message to Node "0x02"; this is package 2 of 3, and is MAX (255) characters long. Whereas:

[0x02, 0x01, 1, 1, 2]

would be Node "0x02" is sending a message to Node "0x01"; this is package 1 of 1, and is 2 characters long.

The following message would be a Broadcast message:  
 [0xFF, 1, 1, 1, 2]

This is indicated by the 0xFF, which means all Slave devices will act upon the message, however, no reply will be sent by any of the Slave devices.

## The DATA field

All the messages exchanged between the Master and the Slave units have to be encapsulated in the SNP transmission.

The command to send is contained in the Data field of the SNP protocol.

All the commands are formed by: the Command string, the String terminator, and some values (Value 1, Value 2, ...). Each value can be a number (1, 2 or 4 bytes long ) or a string.

The Data field maximum length is contained in the MAX\_DATA\_LENGTH

The Data field is formed by:

| NAME              | LENGTH (BYTES) | CONTENTS         |
|-------------------|----------------|------------------|
| Command string    | 0-256 bytes    | Command          |
| String terminator | 1              | 0                |
| Value 1           | 1,2,4          | First parameter  |
| Value 2           | 1,2,4          | Second parameter |
| ....              | 1,2,4          | ....             |

**Example 1: setting the LED intensity to 100**

In this case the Data is composed by the SLED command, the string terminator, and an argument (an unsigned char parameter, 8 bits long):

| COMMAND | STRING TERMINATOR | ARGUMENT |
|---------|-------------------|----------|
| Sled    | 0                 | 100      |

The complete message is:

| SNP PACKAGE       | VALUE                  |         |
|-------------------|------------------------|---------|
| Preamble          | 0xFF                   |         |
| Preamble          | 0xFF                   |         |
| Preamble          | 0xFF                   |         |
| Preamble          | 0xFF                   |         |
| Preamble          | 0xFF                   |         |
| SOH               | 0x01                   |         |
| Source            | 0x01                   |         |
| Destination       | 0x02                   |         |
| TotalPacketNumber | 0x01                   |         |
| PacketNumber      | 0x01                   |         |
| DataLength        | 0x06                   |         |
|                   | 0x00                   |         |
| Data              | Command "sled"         | 0x73(s) |
|                   |                        | 0x6C(l) |
|                   |                        | 0x65l   |
|                   |                        | 0x64(d) |
|                   | String terminator      | 0x00    |
|                   | Argument (value = 100) | 0x64    |
| CRC16             | CRC value = -27888     | 0x10    |
|                   |                        | 0x93    |
| Postamble         | 0xFF                   |         |

The slave will reply to this command with:

| COMMAND | STRING TERMINATOR |
|---------|-------------------|
| "sled"  | 0                 |

**Example 2: requesting the kernel version installed in the PCN-1001**

Example of request

| COMMAND       | STRING TERMINATOR |
|---------------|-------------------|
| "ker_version" | 0                 |

This command does not need any parameter.

The Slave will answer with:

| COMMAND       | STRING TERMINATOR | ARGUMENTS |
|---------------|-------------------|-----------|
| "ker_version" | 0                 | "2.1"     |

In this case, the parameter in the answer of the slave will be a string containing the kernel version.

## Commands availability

These commands are incorporated in the SNP (Small Network Protocol) protocol.

| COMMAND                | DESCRIPTION  |
|------------------------|--|
| <b>address</b>         | Sets the PCN-1001 IP address                             |
| <b>autoled</b>         | Enable the automatic regulation of the LED indicators    |
| <b>diagnostic_en</b>   | Enables or disables the diagnostic                       |
| <b>enable_pc</b>       | Enables or disables the counting process                 |
| <b>fw_version</b>      | Reads the version number of PCN-1001 FPGA firmware       |
| <b>gcounters</b>       | Returns the values of the Incoming and Outgoing counters |
| <b>gdatetime</b>       | Reads the date and the time                              |
| <b>input0 / input1</b> | Sets the functions of the two input lines                |
| <b>ker_version</b>     | Reads the version number of PCN-1001 kernel              |
| <b>output0/output1</b> | Sets the optocoupled outputs open time                   |
| <b>pcn1001_status</b>  | Returns the PCN-1001 diagnostic status                   |
| <b>reset</b>           | Resets the Incoming and Outgoing counters                |
| <b>sdatetime</b>       | Sets Date and Time information                           |
| <b>sled</b>            | Sets the LED intensity                                   |
| <b>sys_version</b>     | Reads the version number of PCN-1001 operating system    |
| <b>version</b>         | Reads the version number of PCN-1001 core software       |

### address

|                               |  |
|-------------------------------|--|
| <b>Command</b>                | address  |
| <b>Command Description</b>    | Sets the IP address of the PCN-1001                      |
| <b>Parameters</b>             | String   |
| <b>Parameters Description</b> | String containing the IP address (e.g.: "10.100.10.100") |
| <b>Returns</b>                |  |

### autoled

|                               |  |
|-------------------------------|--|
| <b>Command</b>                | autoled  |
| <b>Command Description</b>    | Enable the automatic regulation of the LEDs.<br>This regulation is based on the luminosity of acquired images<br>If the automatic regulation is activated the manual control (sled command) will be ignored. |
| <b>Parameters</b>             | Unsigned char (1 byte)   |
| <b>Parameters Description</b> | 0: Disabled<br>1: Enabled  |
| <b>Returns</b>                |  |

### diagnostic\_en

|                               |                                    |
|-------------------------------|------------------------------------|
| <b>Command</b>                | diagnostic_en                      |
| <b>Command Description</b>    | Enables or disables the diagnostic |
| <b>Parameters</b>             | Unsigned char (1 byte)             |
| <b>Parameters Description</b> | 0: Disabled<br>1: Enabled          |
| <b>Returns</b>                |                                    |

**enable\_pc**

|                               |  |
|-------------------------------|--|
| <b>Command</b>                | enable_pc                                |
| <b>Command Description</b>    | Enables or disables the counting program |
| <b>Parameters</b>             | Un unsigned char (1 byte)                |
| <b>Parameters Description</b> | 0: Disable<br>1: Enabled                 |
| <b>Returns</b>                |  |

**fw\_version**

|                               |  |
|-------------------------------|--|
| <b>Command</b>                | fw_version   |
| <b>Command Description</b>    | Returns the PCN-1001 firmware revision.                      |
| <b>Parameters</b>             |  |
| <b>Parameters Description</b> |  |
| <b>Returns</b>                | String containing the firmware revision number (e.g.: "1.8") |

**gcounters**

|                               |   |
|-------------------------------|---|
| <b>Command</b>                | gcounters   |
| <b>Command Description</b>    | Returns the current counter values (In & Out)   |
| <b>Parameters</b>             |   |
| <b>Parameters Description</b> |   |
| <b>Returns</b>                | Two unsigned values (4 bytes long).<br>1 <sup>st</sup> is incoming counter value<br>2 <sup>nd</sup> is outgoing counter value |

**gdatetime**

|                               |   |
|-------------------------------|---|
| <b>Command</b>                | gdatetime   |
| <b>Command Description</b>    | Gets date and time in the PCN-1001                  |
| <b>Parameters</b>             |   |
| <b>Parameters Description</b> |   |
| <b>Returns</b>                | String containing the date and the time in PCN-1001 |

**input0 / input1**

|                               |  |
|-------------------------------|--|
| <b>Command</b>                | input0 / input1  |
| <b>Command Description</b>    | Enable the functions for the two Optoisolated inputs.<br>The available functions are:<br>Reset Counters<br>Enable / Disable person counting.<br><br>For further information see the chapter:<br>"The I/O settings tab- Optocoupled I/O".                 |
| <b>Parameters</b>             | Un unsigned short (2 bytes)  |
| <b>Parameters Description</b> | 0: Input disabled<br>1: Enable the function "reset counters"<br>2: Enable the function "Enable/Disable person counting"<br>3: Test<br>4: Enable the function "reset counters reverse"<br>5: Enable the function "Enable/Disable person counting reverse" |
| <b>Returns</b>                |  |

## ker\_version

|                               |   |
|-------------------------------|---|
| <b>Command</b>                | ker_version   |
| <b>Command Description</b>    | Returns the PCN-1001 Kernel version                       |
| <b>Parameters</b>             |   |
| <b>Parameters Description</b> |   |
| <b>Returns</b>                | String containing the Kernel version number (e.g.: "2.1") |

## output0 / output1

|                               |   |
|-------------------------------|---|
| <b>Command</b>                | output0 / output1   |
| <b>Command Description</b>    | Sets the optocoupled outputs open time.<br><br>For further information see the chapter: "The I/O settings tab-Optocoupled I/O).           |
| <b>Parameters</b>             | Un unsigned short (2 bytes)   |
| <b>Parameters Description</b> | Value indicating output open time (in milliseconds).<br>This value must be a multiple of 4 and included in the range between a 8 and 1020 |
| <b>Returns</b>                |   |

## pcn1001\_status

|                               |   |
|-------------------------------|---|
| <b>Command</b>                | pcn1001_status  |
| <b>Command Description</b>    | Returns the PCN-1001 diagnostic status  |
| <b>Parameters</b>             |   |
| <b>Parameters Description</b> |   |
| <b>Returns</b>                | Returns one unsigned char (1byte) that indicates the diagnose status:<br>If it is 1 the diagnose is positive (no problems occurred)<br>If it is 0 the diagnose is negative (there is a problem) |

## reset

|                               |   |
|-------------------------------|---|
| <b>Command</b>                | reset   |
| <b>Command Description</b>    | Resets the values of the incoming and outgoing counters |
| <b>Parameters</b>             |   |
| <b>Parameters Description</b> |   |
| <b>Returns</b>                |   |

## sdatetime

|                               |  |
|-------------------------------|--|
| <b>Command</b>                | sdatetime  |
| <b>Command Description</b>    | Sets date and time in the PCN-1001   |
| <b>Parameters</b>             | String   |
| <b>Parameters Description</b> | String containing the date and time.<br>Example: 21 May 2006 at 15:39 = "052115392006" |
| <b>Returns</b>                |  |

**sled**

|                               |   |
|-------------------------------|---|
| <b>Command</b>                | sled  |
| <b>Command Description</b>    | Sets the light intensity of LEDs                |
| <b>Parameters</b>             | Un unsigned char (1 byte)                       |
| <b>Parameters Description</b> | 0 ~ 255<br><br>0: Off<br>255: Maximum intensity |
| <b>Returns</b>                |   |

**sys\_version**

|                               |   |
|-------------------------------|---|
| <b>Command</b>                | sys_version   |
| <b>Command Description</b>    | Returns the PCN-1001 operating system version.        |
| <b>Parameters</b>             |   |
| <b>Parameters Description</b> |   |
| <b>Returns</b>                | String containing the OS version number (e.g.: "1.6") |

**version**

|                               |   |
|-------------------------------|---|
| <b>Command</b>                | version   |
| <b>Command Description</b>    | Returns the PCN-1001 counting software version.                     |
| <b>Parameters</b>             |   |
| <b>Parameters Description</b> |   |
| <b>Returns</b>                | String containing the counter software version number (e.g.: "2.0") |

## CRC16 Algorithm

Table based algorithm in C for calculation of CRC16.

```
#include <string.h>
#define MAX_DATA_LEN 4096
#define MAX_PACKET_LEN 5+1+1+1+1+2+MAX_DATA_LEN+2+1
#define MAX_CRC_DIGITS 256
#define BYTE_WIDTH 8
#define CRC_WIDTH 16
#define CRC_MASK 0xFF

static const unsigned short CrcTable[MAX_CRC_DIGITS] =
{
    0,32773,32783, 10,32795, 30, 20,32785,32819, 54,
    60,32825, 40,32813,32807, 34,32867, 102, 108,32873,
    120,32893,32887, 114, 80,32853,32863, 90,32843, 78,
    68,32833,32963, 198, 204,32969, 216,32989,32983, 210,
    240,33013,33023, 250,33003, 238, 228,32993, 160,32933,
    32943, 170,32955, 190, 180,32945,32915, 150, 156,32921,
    136,32909,32903, 130,33155, 390, 396,33161, 408,33181,
    33175, 402, 432,33205,33215, 442,33195, 430, 420,33185,
    480,33253,33263, 490,33275, 510, 500,33265,33235, 470,
    476,33241, 456,33229,33223, 450, 320,33093,33103, 330,
    33115, 350, 340,33105,33139, 374, 380,33145, 360,33133,
    33127, 354,33059, 294, 300,33065, 312,33085,33079, 306,
    272,33045,33055, 282,33035, 270, 260,33025,33539, 774,
    780,33545, 792,33565,33559, 786, 816,33589,33599, 826,
    33579, 814, 804,33569, 864,33637,33647, 874,33659, 894,
    884,33649,33619, 854, 860,33625, 840,33613,33607, 834,
    960,33733,33743, 970,33755, 990, 980,33745,33779, 1014,
    1020,33785, 1000,33773,33767, 994,33699, 934, 940,33705,
    952,33725,33719, 946, 912,33685,33695, 922,33675, 910,
    900,33665, 640,33413,33423, 650,33435, 670, 660,33425,
    33459, 694, 700,33465, 680,33453,33447, 674,33507, 742,
    748,33513, 760,33533,33527, 754, 720,33493,33503, 730,
    33483, 718, 708,33473,33347, 582, 588,33353, 600,33373,
    33367, 594, 624,33397,33407, 634,33387, 622, 612,33377,
    544,33317,33327, 554,33339, 574, 564,33329,33299, 534,
    540,33305, 520,33293,33287, 514
};

void CalcCrc16Block(char *pBlock, // Pointer to start of block
    unsigned short Number, // Number of bytes i block
    short *pCrc) // Will be updated with CRC16
{
    *pCrc = -1;
    while (Number)
    {
        *pCrc = CrcTable[((*pCrc >> (CRC_WIDTH - BYTE_WIDTH)) ^ *pBlock++) &
            CRC_MASK] ^ (*pCrc << BYTE_WIDTH);
        Number--;
    }
}
```

(continued on the next page)



```
int
main (int argc, char *argv[])
{
    char buf[MAX_PACKET_LEN];
    char data[6] = {0x73, 0x6c, 0x65, 0x64, 0x00, 0x64};
    unsigned char src = 0x01;
    unsigned char dest = 0x02;
    char tpn = 0x01;
    char pn = 0x01;
    short datalen = 6;

    short crc;
    int index = 0;
    int data_start;

    buf[index++] = 0xFF;    //Preamble
    buf[index++] = 0xFF;    //Preamble
    buf[index++] = 0xFF;    //Preamble
    buf[index++] = 0xFF;    //Preamble
    buf[index++] = 0xFF;    //Preamble

    buf[index++] = 0x01;    //SOH
    data_start = index;

    buf[index++] = src;     //source address
    buf[index++] = dest;    //destination address
    buf[index++] = tpn;     //Total Packet Number
    buf[index++] = pn;      //Number of this packet
    buf[index++] = datalen & 0x00FF;    //Data Length LSB
    buf[index++] = datalen >> 8;        //Data Length MSB

    if(data) memcpy(&buf[index],data,datalen); //Data copied in buf

    index += datalen;
    CalcCrc16Block(&buf[data_start],6+datalen,&crc);

    buf[index++] = crc & 0x00FF;    //CRC LSB
    buf[index++] = crc >> 8;        //CRC MSB
    buf[index++] = 0xFF;            //Postamble

    return 0;
}
```

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## APPENDIX

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## Note for mounting the front panel with angles higher than 35°

Please contact Eurotech to use this configuration in order to properly configure the software parameters of the PCN-1001.

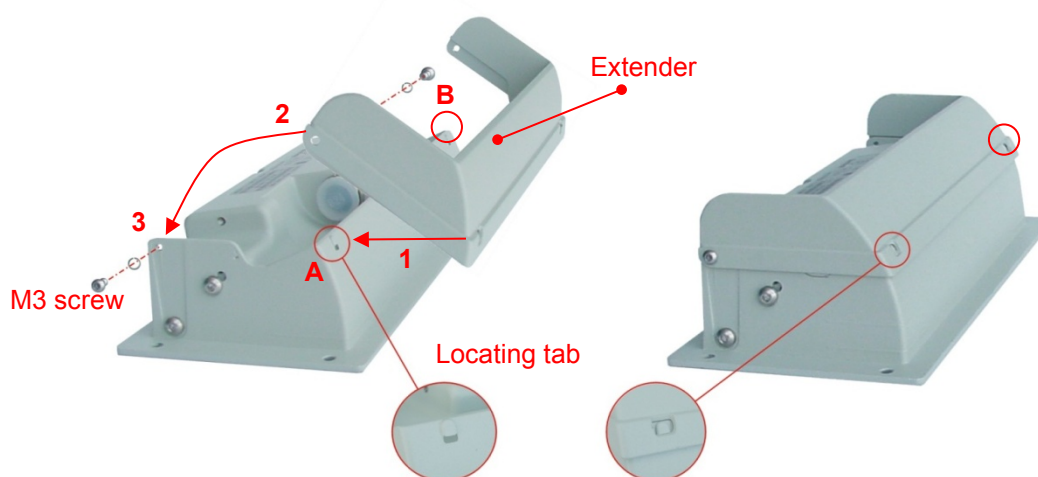
If you need to mount the front panel with angles higher than 35°, it is recommended to PCN-1001 Extender kit. It offers a better protection to the rear connections.

The PCN-1001 Extender kit order code is: M11-10-10-00.

It is recommended to install any cabling before mounting the extender, this will give easier access to M1 and M2. Use the two M3 x 6 hexagonal head screws (and the two split washers) provided to fix it to the PCN-1001. A hexagonal 2 mm (3/32") key/driver is required.

Follow this procedure to mount the PCN-1001 Extender:

1. Place the Extender onto the rear of the PCN-1001; ensure that the two locating tabs (**A** and **B**) are correctly aligned
2. Ensure that the holes on the Extender and on the PCN-1001 are correctly aligned
3. Insert the two washers and the two M3 screws into the holes and firmly tighten them.



### IMPORTANT NOTE!

Once the PCN-1001 is installed, the angle of the front panel cannot be modified and the rear connectors cannot be accessed without removing the entire device from the ceiling.

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## PCN-1001 Logon

The PCN-1001 runs using an embedded Linux Operating System.

Use the ssh protocol (IP: 10.100.10.100) if for any reason it is necessary to log-on the Operating System .

**Example:**

```
ssh root@10.100.10.100
```

These are the default passwords:

| LOGIN   | PASSWORD |
|---------|----------|
| root    | root     |
| ftpuser | ftpuser  |

Passwords can be changed when you are logged on using “root” using the following command:

| COMMAND | SYNTAX             | EXAMPLE                         |
|---------|--------------------|---------------------------------|
| passwd  | passwd <user name> | # passwd ftpuser<br># conf-save |

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# Troubleshooting


**WARNING!**

Before going further with this troubleshooting make sure you have **ALWAYS** installed the **SAME REVISION** of “pcn-1001-Imgserver” and “pcn-1001-demo-win32” (the software package that contains “WinClient” and “RS485\_GUP”).

Incompatibilities will happen and cause problems if older and newer versions of either the “pcn-1001-demo-win32” or “Imgserver” are used together.

| PROBLEM |  | POSSIBLE CAUSE  | REMEDY   |
|---------|--|---|--|
| 1       | The amber and green LED indicators flicker constantly or remain dark.  | PCN-1001 has wrong/no power supply.   | Check the connections and the power requirements.  |
|         |  | PCN-1001 defective.   | Contact your local Eurotech Technical Support Team.<br>Refer to the back cover of this manual for full contact details   |
| 2       | WinClient does not identify the IP address of the PCN-1001 automatically   | Network issue   | Use IPCONFIG / PING to check the network connection.<br>Restart WinClient<br>Type the address of the PCN-1001 manually   |
| 3       | In window 3 the image appears bright or with white spots while in windows 1 and 2 it is possible to see the regular scene as captured by the two cameras (the function “8bit Disp. + median + FPN + ODC” is selected). | The floor is very reflective or has spot lighting.<br>Highly reflective, geometric structures situated on or near the floor, such as the metallic parts for door mechanisms cause extreme patterns of light and darkness.<br>These effects can be caused by solar reflections or strong lighting on metal surfaces. | Lighting of the detection area should be diffused as much as possible.<br><br>Highly reflective structures and any high reflective surface situated on or near the floor should be avoided as much as possible in the detection area.<br>Reduce the reflection by means of non-reflective materials or paints. |
|         |  |   | Modify the “No Tracking Zone”.   |
| 4       | PCN-1001 seems to function but counters are not incremented properly.  | Door is closed and the counting is activated / deactivated by the GPI1/GPI2 inputs so that counting only takes place when the door opens.   | Open the door or check the configuration of the digital inputs.  |
|         |  | PCN-1001 incorrectly configured.  | Adjust the PCN-1001 configuration.<br>Pay particular attention to: <ul style="list-style-type: none"> <li>the background acquisition</li> <li>the door threshold</li> </ul>  |
|         |  | PCN-1001 defective.   | Contact your local Eurotech Technical Support Team.<br>Refer to the back cover of this manual for full contact details   |
| 5       | It is impossible to see the images in windows 1 and 2 even if the PCN-1001 is correctly connected via USB to the Host PC and the drivers are correctly installed   | Host PC colour depth too high   | Set the Host PC colour depth to 16 bit (or less) by going to the Start Menu > Settings > Control Panels > Display > Settings   |
|         |  | Host PC firewall incorrectly configured   | Refer to Configure the Host PC firewall on page 31   |
| 6       | Counter results poor in one / both directions (i.e.: false positives due to shoulders or other body parts counted as people).  | Disturbing objects in the detection range block the PCN-1001.   | Remove the objects and reacquire carefully the background (refer to problem # 2).  |
|         |  | PCN-1001 incorrectly set.   | Rearrange the PCN-1001   |
|         |  | PCN-1001 installed too high/low.  | Install the PCN-1001 at a maximum of 250 cm above the floor.<br><br>Evaluate carefully the average population's high.  |
|         |  | The detection area is too little respect to the gate  | Modify the “No Tracking Zone”.   |

| PROBLEM |                          | POSSIBLE CAUSE   | REMEDY   |
|---------|--------------------------|--|--|
| 7       | Too many false negatives | There is a counting enable delay   | The digital inputs should enable the PCN-1001 as soon as the door starts opening.  |
| 8       | Too many false positives | There is a counting disable delay  | The digital inputs should disable the PCN-1001 after the door is closed completely.  |
|         |                          | The "Use Move detection" grey circle appears green even if nobody is crossing the detection area | Reacquire carefully the background (refer to problem # 2). It is strongly recommended to don't acquire the background if the circle appears green but nobody is crossing the detection area. |
|         |                          | The door mechanisms are counted as people entering.  | Shift the "threshold line" outside the mechanism motion range.   |

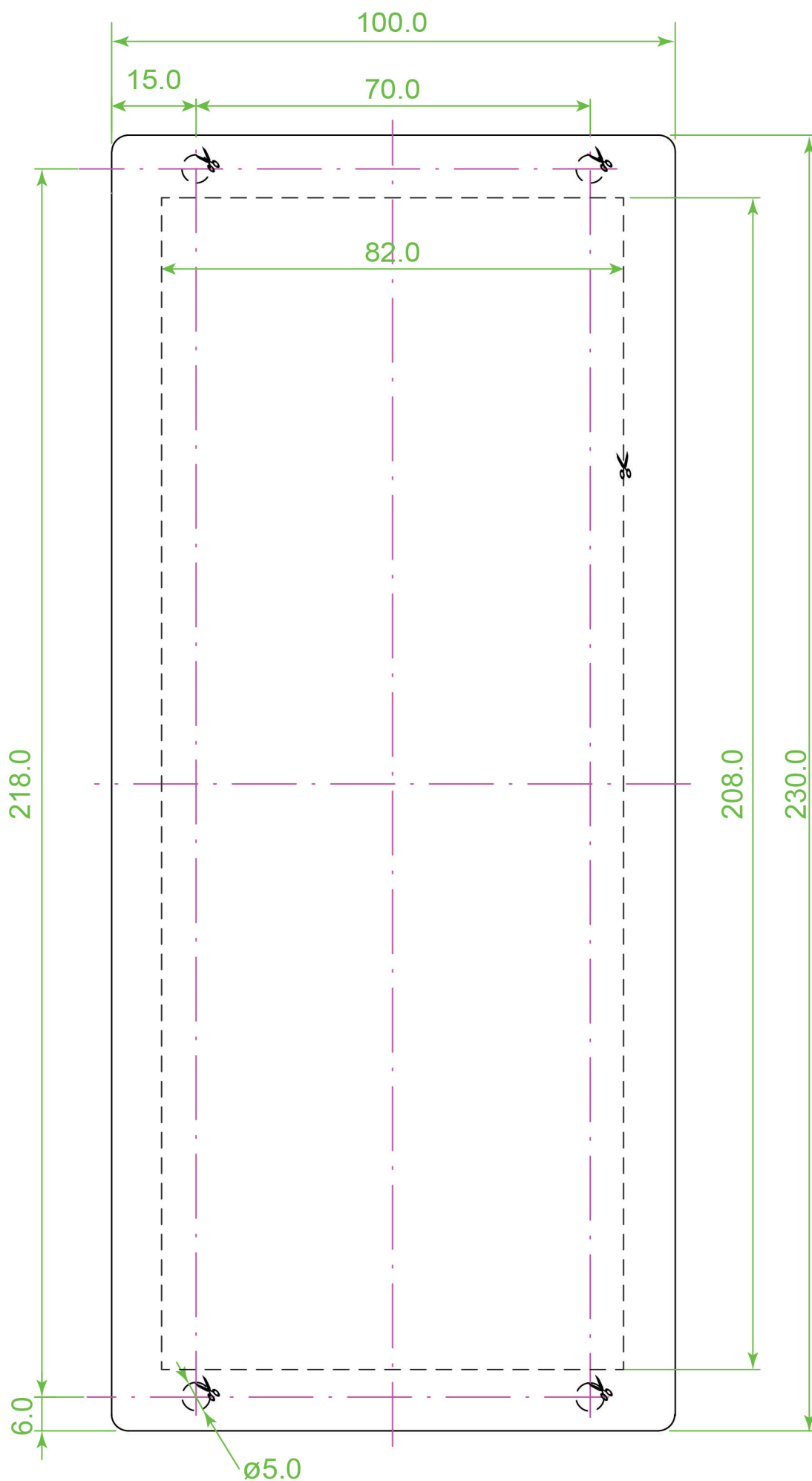
# Cut-out template

To simplify the PCN-1001 installation you can print this page in A4 format (e.g.: on card or plasticard) without any scaling and use it as a cut-out template.

Before using this page, verify that the dimensions in the printed sheet correspond to the real ones.

Dimensions in millimetres

10.0 mm (scale 1:1)



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# Notes

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